

# Test Specifications Fuel Injection Pumps and Governors

WPP 001/4 MAN 12,3 a

1. Edition

En

Testoil-ISO 4113

PE 6 P 120 A 821 LS 409 RSV 500-750 P0/483

supersedes  
company MAN

engine D 3256 BTXUE

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers.

## A. Fuel Injection Pump Settings

Port closing at prestroke **2,8 - 2,9**  
 $(2,75 - 2,95)$  mm (from BDC)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
700	9,2-9,3	13,2 - 13,6	0,5(0,9)			
500	4,4-4,6	1,7 - 2,3	0,8(1,2)			

Adjust the fuel delivery from each outlet according to the values in 

## B. Governor Settings

Upper rated speed			Intermediate rated speed			Lower rated speed			Torque control	
Degree of deflection of control lever	Control rod travel rev/min	mm	Degree of deflection of control lever	Control rod travel rev/min	mm	Degree of deflection of control lever	Control rod travel rev/min	mm	Control rod travel rev/min	mm
loose	800	0,3 - 1,0	-	-	-	ca. 21	500	4,5		
	x = 1,25						500	4,4-4,6		
ca. 29	8,2	750 - 755					520-550 = 2,0			
	4,0	780 - 790								
	950	0,3 - 1,0								

The numbers denote the sequence of the tests

## C. Settings for Fuel Injection Pump with Fitted Governor

(2) Full-load stop		(6) Rotational-speed limitat.	(3a) Fuel delivery characteristics		Starting fuel delivery		(5a) Idle stop		
Test oil temp. 40°C (104°F)	rev/min	Note: changed to rev/min	rev/min	cm³/1000 strokes	idle	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm
700	132,0-136,0 (129,0-139,0)	750-755 *	-	-	100	19,5 - 21,0 mm RW	-	-	-

Checking values in brackets

\* 1 mm less control rod travel than cat. 2

5.82

A2

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①

# Test Specifications Fuel Injection Pumps ① and Governors

40

WPP 001/4 MB 19,1 c  
1. Edition

En

PE 12 P 100 A 320 LS 820 RQV 350-1100 PA370R

supercedes  
company  
engineDaimler-Benz  
OM 404  
(370 PS)

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

3,40-3,50

Port closing at prestroke

(3,35-3,55)

mm (from BDC)

Rotational speed rev/min 1	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Difference cm³/ 100 strokes 4	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Spring pre-tensioning (torque-control valve) mm 6
1080	11,5	10,4-10,6	0,3(0,6)			
	(+0,1)					
350	7,5-8,0	1,8- 2,3	0,4(0,7)			

Adjust the fuel delivery from each outlet according to the values in [ ]

Testoil-ISO 4113

## B. Governor Settings

Upper rated speed Degree of deflection of control lever 1	rev/min 2	Control rod travel mm 3	Intermediate rated speed			Lower rated speed Degree of deflection of control lever 7	rev/min 8	Control rod travel mm 9	Sliding sleeve travel rev/min 10	mm 11
			Degree of deflection of control lever 4	rev/min 5	Control rod travel mm 6					
ca.68	1080	15,2-17,8	-	-	-	ca.17	100	mind.8		
	1350	0 - 1					350	6,4-6,6	300	0,4-1,4
ca.65	10,5	1120-1130					520-580 = 2,0		800	4,8-5,4
	4,5	1205-1235					700 0 - 1		1120	8,3
						3a			-	-

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F) ②		Rotational-speed limitation intermediate speed ②b	Fuel delivery characteristics ⑤a high idle speed ⑤b		Starting fuel delivery Idle switching point ⑥	Torque-control travel Control rod travel ⑤		
rev/min 1	cm³/1000 strokes 2	rev/min 3	rev/min 4	cm³/1000 strokes 5	rev/min 6	cm³/1000 strokes 7	rev/min 8	Control rod travel mm 9
1080	104,0-107,0 (102,0-109,0)	1120-1130*			100	110 - 130		
			1220	4,5 mm RW dispersion max. 6	350	19 - 24		
					100-190 ( 90-200 )			

Checking values in brackets

\* 1 mm less control rod travel than col. 2

8.77

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# ① Test Specifications Fuel Injection Pumps ① and Governors

11.74

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VDT-WPP 001/4 SCA 11,0 n 1

En

PE 6 P 110 A 720 RS 3003 RQV 250-1100 PA 183 R

RQV 250-1100 PA 183 R

supersedes  
company  
engine

Scania  
D 11

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers.

## A. Fuel Injection Pump Settings

**Port closing at prestroke**      **3,0 + 0,1**      **mm (from BDC)**      **- 0,05**

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm <sup>3</sup> /100 strokes 3	Difference cm <sup>3</sup> / 100 strokes 4	Control rod travel mm	Fuel delivery cm <sup>3</sup> /100 strokes 3	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
1000	12	11,3 - 12,1	0,5			2,5±0,1**
600	9	4,7 - 5,9				(max. 2,2-2,9)
	12	11,3 - 12,8				
	15	16,7 - 18,4				
200	9	3,5 - 4,5				

**Adjust the fuel delivery from each outlet according to the values in**

\*\* In the case of greater dispersion alter the delivery-valve spring pre-tension accordingly.

## **B. Governor Settings**

RQV .. 183

Upper rated speed				Intermediate rated speed				Lower rated speed				Sliding sleeve travel	
Degree of deflection of control lever	rev/min	Control rod travel	1a	Degree of deflection of control lever		Control rod travel	4	Degree of deflection of control lever		Control rod travel	3	rev/min	mm
1	2	mm	rev/min	4	5	mm	7	8	9	3	10	mm	11
ca.66	1120	15,0-17,6	-	-	-	-	ca.10	150	6,5-8,0	1120	8,3		
	1200	9,2-13,6						250	3,6-6,1				
	1300	1,0- 7,6						400	1,1-2,4				
	1410	0						500	0				

Torque control travel = mm

#### **C. Settings for Fuel Injection Pump with Fitted Governor**

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation	Fuel delivery characteristics	Starting fuel delivery	Torque-control travel
rev/min	cm <sup>3</sup> /1000 strokes	rev/min	high idle speed	idle switching point	Control rod travel
1	2	3	4	5	mm
1100	141,0-143,0	1135-1145*	600 1200	143,0-147,0 43,0- 53,0	240,0-290,0 12,0- 16,0
(increase by ± 2,0 cm <sup>3</sup> !)		dispersion max. 4		dispersion max. 2	

#### **Checking values in brackets**

\* 1 mm less control rod travel than col. 2

①

# Test Specifications Fuel Injection Pumps ① and Governors

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11.74

VDT-WPP 001/4 SCA 11,0 o  
1. Edition

En

PE 6 P 110 A 720 RS 3004 RQV 250-1100 PA 184 R

Adjustment test - pressure drop - n = 500 r/min:

Setting 332-348 mm Hg

0.45-0.47 bar = 0.1 mm control-rod travel decrease

Measurement 150-190 mm Hg

0.21-0.26 bar = 2.0 mm control-rod travel decrease

supersedes

company

engine

Scania  
DS 11 LB 80

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke 3,0 + 0,1 mm (from BDC)

Rotational speed rev/min 1	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Difference cm³/ 100 strokes 4	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Spring pre-tensioning (torque-control valve) mm 6
1000	12	13,4 - 14,0	0,6			2,5 ± 0,1* (max. 2,2-2,9)
600	9	5,2 - 6,6				
	12	12,1 - 13,8				
	15	16,9 - 18,8				
200	9	3,5 - 4,7				

Adjust the fuel delivery from each outlet according to the values in

## B. Governor Settings

RQV .. 184 R

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel	
Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm
1	2	3	4	5	6	7	8	9	10	11
ca.66	1150	16,0-19,0	-	-	-	ca.10	100	6,3-7,9	1170	8,3
	1440	0					250	4,8-6,4		
ca.62	1100	15,0-17,4					400	2,5-3,8		
	1200	8,4-12,3					550	1,0-2,4		
	1300	1,0- 6,4					680	0		
	1400	0								

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed		Fuel delivery characteristics high idle speed		Starting fuel delivery Idle switching point		Torque-control travel	
rev/min 1	cm³/1000 strokes 2	rev/min 3	rev/min 4	rev/min 5	cm³/1000 strokes 6	rev/min 7	cm³/1000 strokes 8	rev/min 9	Control rod travel mm
1100	0,6 bar 182,0-184,0	1120	600	0,6 bar 183,0-187,0	100	155,0-175,0			
			500	0 bar 128,0-132,0	225	11,0- 13,0			
	(increase by ± 2,0 cm³!)				dispersion max. 2 )*				dispersion max. 4

Checking values in brackets

\* 1 mm less control rod travel than col. 2

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# ① Test Specifications Fuel Injection Pumps ① and Governors

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WPP 001/4

4. Edition

PES 8 P 120 A 321 RS 242 RQV 250-1150 PA 208 DR

En

supersedes  
company  
engine2.74  
Berliet  
V 835Values apply to fuel-injection test tubing  
8 x 2 x 1000

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers.

## A. Fuel Injection Pump Settings

Port closing at prestroke 2,4+0,1 mm (from BDC) Cyl. 5

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
1000	12	15,4 - 16,2	0,7			
600	9	5,2 - 6,2				
	12	9,5 - 11,0				
	15	16,0 - 17,7				
200	9	4,5 - 5,5				

Adjust the fuel delivery from each outlet according to the values in [ ]

## B. Governor Settings

Upper rated speed rev/min	Degree of deflection of control lever			Intermediate rated speed rev/min			Lower rated speed rev/min			Sliding sleeve travel mm						
	Control rod travel mm	rev/min	Control rod travel mm	1a	Degree of deflection of control lever	5	Control rod travel mm	4	Control rod travel mm	8	Control rod travel mm	3	rev/min	10	mm	11
ca.68	1170	15,0-18,2	-		-	-	-	-	ca.12	100	6,1-8,0		1190	8,3		
	1220	10,2-14,5								250	4,9-6,7					
	1300	1,8-11,0								420	2,0-3,9		1150	0		
	1420	0								600	0,3-1,8		500	1,1-1,3		
										710	0					

Torque control travel a = 1,2 mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed	Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point	Torque-control travel		
rev/min	cm³/1000 strokes	4a	4	5	6	7	8	9
1	2	3						
1150	144,0-146,0	1260; 1290-1300*	1000	139,0-142,0	100	mind. 90,0		
			750	124,0-128,0	250	13,0- 21,0		
			500	91,0- 97,0	Charge-over point	-		
					200 - 130 min⁻¹			

Checking values in brackets

\* 1 mm less control rod travel than col. 2

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10.76

# ① Test Specifications Fuel Injection Pumps ① and Governors

40

VDT-WPP 001/4

1. Edition

En

PE 6 P 120 A 420 LS 245 RQV 300-1050 PA 239 KR  
Values apply to fuel-injection test tubing  
8 x 2 x 1000

supersedes  
company  
engine

Allis Chalmers  
Mark II

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke		2,8 + 0,1	mm (from BDC)				
Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm	
1000	12	26,4-27,1	1,0			Manifold-pressure compensator adjustment n = 500 r/min pressure drop in bar: 0.98 - start = full-load control-rod travel minus 0.1-0.3 mm 0.31 - end = full-load control-rod travel minus 3.2-3.4 mm	
	6	8,6- 9,8					
	12	26,3-28,1					
	15	33,8-36,2					
600	12	26,3-28,1					
200	6	4,2- 5,2					

Adjust the fuel delivery from each outlet according to the values in  Gap\* in manifold-pressure compensator = 9.0-9.5 mm!

## B. Governor Settings

Upper rated speed			Intermediate rated speed				Lower rated speed			Sliding sleeve travel	
Degree of deflection of control lever	rev/min	Control rod travel mm	1a	Degree of deflection of control lever	rev/min	Control rod travel mm	4	Degree of deflection of control lever	rev/min	Control rod travel mm	1
1	2	3	2a	4	5	6	7	8	9	10	11
ca.66	1050	15,0-18,0		-	-	-		ca.10	250	6,4-8,0	
	1100	10,7-15,0							350	3,0-5,2	
	1150	6,0-11,6							450	1,3-2,8	
	1210	0 - 7							550	0	
	1300	0									

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed		Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point		Torque-control travel	
rev/min	cm³/1000 strokes	2b	4a	5a	5b	6	cm³/1000 strokes	8	Control rod travel mm
1	2	3	4	5	6	7	8	9	9
1050	1,3 bar 256,0-258,0	1080-1090*	900 700 500	1,3 bar 251,0-257,0 238,0-244,0 0 bar 173,0-177,0	100 300 Change-over point 250-150 U/min	270,0-310,0 19,0- 25,0 250-150 U/min			
	(increase by ± 1,0 cm³!)								

Checking values in brackets

\* 1 mm less control rod travel than col. 2

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② **Test Specifications  
Fuel Injection Pumps ②  
and Governors**

**40**

WPP 001/4

1. Edition

En

PE 6 P 120 A 720 LS 3806 RQ 250/1200 PA 356 R

supersedes

company

engine

FIAT  
8260.02.405

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

**A. Fuel Injection Pump Settings**

3.50-3.60  
(3.45-3.65) mm (from BDC)  
Port closing at prestroke

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm <sup>3</sup> /100 strokes	Difference cm <sup>3</sup> / 100 strokes	Control rod travel mm	Fuel delivery cm <sup>3</sup> /100 strokes	Spring pre-tensioning (torque-control valve) mm
1200	9,3-9,4	17,3-17,7	0,5(0,9)			
		2,8- 3,6	0,8(1,2)			

Adjust the fuel delivery from each outlet according to the values in

**B. Governor Settings**

Checking of slider PRG check		Full-load speed regulation				Idle speed regulation				Torque control	
Control rod travel mm	rev/min	Setting point rev/min	Control rod travel mm	Setting point rev/min	Control rod travel mm	Test specifications rev/min	Test specifications rev/min	Control rod travel mm	Control rod travel mm	Control rod travel rev/min	Control rod travel mm
650	15,6-16,4	650	16,0	8,3	1245-1260	250	6,8	100	min.8,6		
1400	0 - 1,0			4,0	1285-1315			250	6,7-6,9	390-430= 2,0	

Torque-control travel  
on flyweight assembly dimension a = mm 1 mm less control rod travel

**C. Settings for Fuel Injection Pump with Fitted Governor**

Full-load delivery on governor control lever Test oil temp. 40°C (104°F)		Control rod stop	Fuel delivery characteristics			Starting fuel delivery idle speed
rev/min	cm <sup>3</sup> /1000 strokes	rev/min	rev/min	cm <sup>3</sup> /1000 strokes	rev/min	cm <sup>3</sup> /1000 strokes/mm
1200	173,0 - 177,0 (170,0 - 180,0)				100	14,0 - 15,0

Checking values in brackets

10.79

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A12

A12

⑥ **Test Specifications**  
**Distributor-type**  
**Fuel-injection Pumps**

**46**

WPP 001/4 VW 1,6 b 2

1. Edition

VE 4/9 F 2400 R 66-10    Overflow temperature 45° C  
 0 460 494 080

supersedes  
company  
engine

VWW  
1,6

All test specifications are valid only for Bosch Fuel-injection Pump Test Benches and Testers

Test Instructions and Test Equipment

see VDT-W-460/ .

Pre-stroke setting      mm

1. Settings	Rot speed rev/min	Settings	Charge-air press. bar (kgf/cm²)	Difference in delivery cm³
1.1 Timing device travel	1500	3,1-3,5 mm		
1.2 Supply-pump pressure	1500	4,9-5,5 bar (kgf/cm²)		
1.3 Full-load delivery with charge-air pressure	1500	33,0-34,0 cm³/1000 strokes		2,5(0,3)
Full-load delivery without charge-air pressure	-	-- cm³/1000 strokes		
1.4 Idle regulation	415	6,0-10,0 cm³/1000 strokes		2,5(0,3)
1.5 Full-speed regulation	100	min. 38,0 cm³/1000 strokes		
1.6 Start	2600	11,0-17,0 cm³/1000 strokes		
1.7 Load-dependent port-closing	-	-		

**2. Test Specifications**      checking values in brackets ( )

2.1 Timing device	n = rev/min mm	1000 1,4-2,2(1,1-2,5)	1500 (2,6-4,0)	2400 6,1-6,9(5,8-7,2)
2.2 Supply pump	n = rev/min bar (kgf/cm²)	400 2,1-2,7		2400 6,9-7,5
Overflow delivery	n = rev/min cm³/10 s	500 55-111(40-126)		2400 55-111(40-126)

**2.3 Fuel deliveries**

Speed control lever	Rot. speed rev/min	Fuel delivery cm³/1000 strokes	Charge-air press. bar (kgf/cm²)	Designation	for assembly and adjustment mm
End stop	2700 2600 2400 1500 600	2,0-10,0 ( 2,0-10,0) (10,0-18,0) 27,7-30,3 (26,7-31,3) (31,2-35,8) 21,5-24,5 (20,0-26,0)		K KF MS SVS FH*)	3,2-3,4 5,7-5,9 1,3-1,5 max.2,5 1,8-2,4
switch-off	2400	0		X K B L	18,4-20,4 9,1-12,9
Idle stop	1200 600 415	max. 3,0 max. 6,0 (4,0-12,0)			
End stop	400 500	min.17,0 max.23,0			
2.4 Solenoid	cut-in voltage rated voltage	min.10V 12V		Observations *) operating stroke (cold-start accel.)	

Testoil-ISO 4113

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6.82

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② **Test Specifications  
Fuel Injection Pumps ②  
and Governors**

40

WPP 001/4 MB 19,1 L 1

1. Edition

En

PE 12 P 100 A 320 LS 828 RQ 1050 PA 310 R

supersedes  
company  
engine

Daimler-Benz  
OM 404  
276 kW (375 PS)

12 - 1 - 5 - 9 - 8 - 3 - 4 - 11 - 10 - 2 - 6 - 7  
0-45 -60 -105-120-165-180-225-240-285-300-345° ± 0,5°  
(± 0,75°)

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

### A. Fuel Injection Pump Settings

3,20-3,30

Port closing at prestroke

(3,15-3,35)

mm (from BDC) Cyl. 12

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
1000	12,4+0,1	10,8-11,0	0,3(0,6)			
250	7,9-8,1	1,2- 1,8	0,3(0,5)			

Adjust the fuel delivery from each outlet according to the values in

Testoil-ISO 4113

### B. Governor Settings

Checking of slider PRG check		Full-load speed regulation				Idle speed regulation				Torque control	
Control rod travel rev/min	Control rod travel mm	Setting point rev/min	Control rod travel mm	Test specifications rev/min	Setting point rev/min	Control rod travel mm	Test specifications rev/min	Control rod travel mm	Control rod travel rev/min	Control rod travel mm	
1	2	3	4	5	6	7	8	9	10	11	12
-	-	-	-	11,4 4,9	1055-1060 1095-1105	-	-	-	-	-	-

1055-1060 min⁻¹

1 mm less control  
rod travel

Torque-control travel  
on flyweight assembly dimension a =

mm

Speed regulation: At

### C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery on governor control lever Test oil temp. 40°C (104°F)		Control rod stop		Fuel delivery characteristics		Starting fuel delivery Idle speed	
rev/min	cm³/-1000 strokes	rev/min	rev/min	cm³/-1000 strokes	rev/min	cm³/1000 strokes/mm	
1	2	3	4	5	6	7	
100	108,0-110,0 (106,0-112,0)	-	-	-	100	19,5-21 mm RW	High idle speed
					1100	4,0(6,0) cm³/1000 dispersion	

Checking values in brackets

4.81

A18

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# ① Test Specifications Fuel Injection Pumps ① and Governors

40

WPP 001/4 VOL 7,0k 3

1. Edition

En

PE 6 P 110 A 320 RS 423

RQV 250-1250 PA 563

supersedes  
company  
engine

Volvo  
TD 70 G  
125 kW (170 PS)

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke		3,0-3,1 (2,95-3,15)		mm (from BDC)							
Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes		Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes		Spring pre-tensioning (torque-control valve) mm			
700	9,0-9,1	7,2-7,4	0,4(0,8)					2,5 ± 0,1			
	250	4,5-4,7									

Adjust the fuel delivery from each outlet according to the values in 

## B. Governor Settings

Upper rated speed Degree of deflection of control lever	1 rev/min Control rod travel mm	2 Control rod travel mm 3 rev/min	Intermediate rated speed Degree of deflection of control lever			4 Control rod travel mm	Lower rated speed Degree of deflection of control lever			Sliding sleeve travel 1 rev/min mm	
			5 rev/min	6 mm	7 rev/min		8 rev/min	9 mm	10 rev/min	11 mm	
max.	1250	15,2-17,8	-	-	-	ca. 11	100	min. 6,0	200	1,1-1,4	
ca. 64	8,0	1290-1300					250	4,5-4,7	550	3,5-3,7	
	4,0	1360-1390					380-440	= 2,0	900	5,2-5,3	
	1450	0- 1,0							1250	7,9	

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed		Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point		Torque-control travel	
rev/min	cm³/1000 strokes	2	3	4a	5	6	7	8	9
700	72,0-74,0 (69,0-77,0)		1290-1300*	-	-	100	140,0-170,0 / 20,0-21,0 mm RW	-	-

Checking values in brackets

\* 1 mm less control rod travel than col. 2

A22

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5.82

A22

② **Test Specifications  
Fuel Injection Pumps ②  
and Governors**

**40**

WPP 001/4 FBW 11,9 c

1. Edition

En

PE 6 P 120 A 721 RS 287

RQ 250/1075 PA 388 DR

supersedes

company

F B W

engine

EU3A/E3a

(191 kW - 260 PS)

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers.

### A. Fuel Injection Pump Settings

Port closing at pre-stroke 2,80-2,90  
(2,75-2,95) mm (from BDC)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm <sup>3</sup> /100 strokes	Difference cm <sup>3</sup> / 100 strokes	Control rod travel mm	Fuel delivery cm <sup>3</sup> /100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
1050	10,3	19,2-19,6	0,5(0,8)			
	+0,1					
250	7,4-7,6	4,5 - 5,1	0,4(0,7)			

Adjust the fuel delivery from each outlet according to the values in

**Testoil-ISO 4113**

### B. Governor Settings

Checking of slider PRG check Control rod travel rev/min	1	Full-load speed regulation				Idle speed regulation				Torque control	
		Setting point rev/min	Control rod travel mm	Test specifications Control rod travel mm	rev/min	Setting point rev/min	Control rod travel mm	Test specifications Control rod travel mm	rev/min	Control rod travel rev/min	Control rod travel mm
600	15,6-16,4	600	16,0	9,3	1120-1135	250	7,5	100	min.9,0	1050	10,3-10,4
1250	0 - 1,0			4,0	1175-1206			250	7,4-7,6	900	10,6-10,9
								400-440=2,0		750	11,0-11,2
									600	11,1-11,2	

Torque-control travel  
on flyweight assembly dimension a

0,65 mm

Speed regulation Al

1120-1135 min<sup>-1</sup>

1 mm less control  
rod travel

### C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery on governor control lever Test oil temp. 40°C (104°F)		Control rod stop rev/min	Fuel delivery characteristics		Starting fuel delivery idle speed	
rev/min	cm <sup>3</sup> /1000 strokes	3	rev/min	cm <sup>3</sup> /1000 strokes	rev/min	cm <sup>3</sup> /1000 strokes/mm
LDA 1050	0,7 bar 192,0-196,0 (189,0-199,0)	600	LDA 600 LDA 600	0,7 bar 163,0-169,0 (160,0-170,0) 0 bar 120,0-124,0 (117,0-127,0)	100	150-170

Checking values in brackets

B1

11.81

**BOSCH**

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## D. Adjustment Test for Manifold Pressure Compensator

-2-

Test at n =

600

rev/min decreasing pressure - in bar gauge pressure

FBW 11,9 c

Pump/governor	Setting	Measurement	Control rod travel mm	diminution difference (1)
	Gauge pressure =	bar	Gauge pressure =	bar
287 with 388 DR	0,7			11,1 - 11,2
			0,36	10,7 - 10,8
			0,26	9,8 - 10,0
			0	9,4 - 9,5

Notes

(1) when n =

rev/min and  
gauge pressure =

bar (= maximum full-load control rod travel)

B2

Testoil-ISO 4113

En

② **Test Specifications  
Fuel Injection Pumps ②  
and Governors**

**40**

WPP 001/4 MB 9,6i  
3. Edition

Ed

PE 6 P 100 A 320 LS 841

RQ 300/1150 PA 187R (1)  
RQV300/1150 PA 227R (2)

supersedes  
company  
engine

6.79  
Daimler Benz  
OM 401  
150 kW (204 PS)

6 - 3 - 5 - 2 - 4 - 1  
0 - 45 - 120-165-240-285

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

**A. Fuel Injection Pump Settings**

(3,15-3,35)  
Port closing at prestroke

3,20-3,30

mm (from BDC) RW 10,5

Cyl. 6

Rotational speed rev/min:	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1150	11,8+0,1	11,5-11,7	0,3(0,6)	12,5+0,1	11,6-11,8	
	7,6-7,8	1,2-1,8		8,2-8,4	1,2-1,8	

Adjust the fuel delivery from each outlet according to the values in

RQ - 187 R

**B. Governor Settings**

Checking of slider PRG check		Full-load speed regulation				Idle speed regulation				Torque control	
Control rod travel mm	Setting point rev/min	Control rod travel mm	Test specifications rev/min	Setting point rev/min	Control rod travel mm	Test specifications rev/min	Control rod travel mm	Control rod travel mm	rev/min	Control rod travel mm	
600	13,8-14,6	600	14,2	10,8	1195-1210	300	7,7	100	min.9,2	1150	11,8-11,9
				4,0	1235-1265			300	7,6-7,8	600	11,8-12,0
1400	0 - 1							415-	455 = 2,0		

Torque-control travel  
on flyweight assembly dimension a =

mm

Speed regulation: At

1 mm less control  
rod travel

**C. Settings for Fuel Injection Pump with Fitted Governor**

Full-load delivery on governor control lever Test oil temp. 40°C (104°F)		Control rod stop	Fuel delivery characteristics			Starting fuel delivery idle speed	
rev/min	cm³/-1000 strokes	rev/min	rev/min	cm³/-1000 strokes	rev/min	cm³/1000 strokes/mm	
1150	115,0-117,0 (113,0-119,0)	500			100	110 - 130	

Checking values in brackets

10.80

Testoil-ISO 4113

B3

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## B. Governor Settings

RQV...227

MB 9,6 i  
(2)

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel	
Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm
1	2	3	4	5	6	7	8	9	10	11
ca.68	1150 1400	15,2-17,8 0 - 1	-	-	-	ca.18	100 300 740-800	min.9,8 8,2-8,4 =2,0	300 800 1200	0,4-1,5 4,4-4,8 8,3
ca.64	11,5 4,0	1190-1200 1265-1295				(3a)				

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp 40°C (104°F) (2)			Rotational-speed limitation intermediate speed (2b)			Fuel delivery characteristics high idle speed (5a) (5b)			Starting fuel delivery Idle switching point (6)			Torque-control travel (5)	
rev/min	cm³/1000 strokes	rev/min	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm	rev/min	mm
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1150	115,0-117,0 (113,0-119,0)	1190-1200+				100	110 - 130						
						100-220 (80-240)							

Checking values in brackets

\* 1 mm less control rod travel than col: 2

## D. Adjustment Test for Manifold Pressure Compensator

Test at n = rev/min decreasing pressure - in bar gauge pressure increasing

Pump/governor	Setting	Measurement	Control rod travel diminution difference
	Gauge pressure = bar	Gauge pressure = bar	mm

En

10.80

B4

Testoil-ISO 4113

B4

# Test Specifications Distributor-Type Fuel Injection Pump

46

WPP 001/4 IHC 2,9 c 3

1. Edition

VA 3/100 H 1100 CR 62  
0 460 303 144

supersedes  
company IHC  
engine D 179-WW 406 D

Setting of the pointer at a stroke of 1 mm in relation to outlet "A".

Pre-stroke setting 0,3 mm ± 0,04

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers  
Test Instructions and Test Equipment VDT-WPP 161/4 B  
Pre-setting see reverse side

1. Settings	rev/min	Settings	Charge-air press kp/cm <sup>2</sup>	Difference in delivery cm <sup>3</sup>
1.1 Timing device travel	600	2,9-3,9 mm		
1.2 Supply pump pressure	600	4,0-4,4 kp/cm <sup>2</sup>		
1.3 Full-load delivery without charge-air pressure	800	66,0-67,0 cm <sup>3</sup> /1000 strokes		2,5
Full-load delivery with charge-air pressure	--	-- cm <sup>3</sup> /1000 strokes		
1.4 Idle speed regulation	375	12,0-18,0 cm <sup>3</sup> /1000 strokes		3,0
1.5 Start 196 bar	100	mind.90,0 cm <sup>3</sup> /1000 strokes		
1.6 Full-load speed regulation	1200	21,0-29,0 cm <sup>3</sup> /1000 strokes		

Testoil-ISO 4113

2. Test Specifications		Checking values in brackets			
2.1 Timing device	rev/min	170-320(140-350)	400	600	850-1000
	mm	Start	1,2-2,2(0,9-2,5)	(2,6-4,2)	5,2-5,9(4,9-6,2)
2.2 Supply pump	rev/min	200		600	1100
	kp/cm <sup>2</sup>	1,6-2,1(1,4-2,3)		(3,8-4,6)6,1-6,6(5,9-6,8)	
Overflow delivery	rev/min	500		1100	
	cm <sup>3</sup> /10 s	55-100(40-110)		55-100(40-110)	

2.3 Fuel deliveries				
Speed control lever	Delivery lever	rev/min	cm <sup>3</sup> /1000 strokes	Charge-air pressure kp/cm <sup>2</sup>
End stop	Full	1230-1280 (1210-1300) 1200 1130-1150 1080 800 500	0  Start 69,0-72,0 64,5-67,5	(20,0-30,0) (68,0-73,0) (65,5-67,5) (63,5-68,5)
	Stop	1100	0	
Idle stop	Full	440-530 (420-550) 375	0	(11,0-19,0)
	Start	100	mind.90,0	
End stop		220-300		

B7

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Angle to the stop-plate	Pre-setting dimensions
Pump α 25 ± 4° β 45 ± 8° γ 30 - 8° δ 60 ± 8°	Pump Dimension IV = 2,0 mm Dimension V = 24,6 mm

Testoil-ISO 4113

# ① Test Specifications Fuel Injection Pumps ① and Governors

40

WPP 001/4 SCA 11,0 u 5

1. Edition

En

PE 6 P 120 A 720 RS 7001

RQV 250-1000 PA 472 R

supersedes

company: Scania  
engine DS 11

Values only apply to test nozzle-and-holder assembly 1 688 901 019 and fuel-injection test tubing 1 680 750 067.

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke		4,0-4,1 (3,95-4,15)		mm (from BDC)					
Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm			
1000	12,3+0,1	20,7-21,1	0,5(0,9)						
	4,2-4,4	1,6- 2,0	0,5(0,8)						

Adjust the fuel delivery from each outlet according to the values in

Testoil-ISO 4113

## B. Governor Settings

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel	
Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm
1	2	3	18	4	5	4	7	3	10	11
max.	1000	15,2-17,8	-	-	-	ca.10	100	min.6,0	200	1,0-1,2
ca.60	11,3 4,0 1300	1040-1050 1135-1165 0 - 1,0	2a	5 6	5 6	3a	225 290-350= 2,0	4,2-4,4 2,0	470 730 1000	3,4-3,8 5,1-5,3 7,7

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed		Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point		Torque-control travel	
rev/min	cm³/1000 strokes	rev/min	4a	rev/min	5a	rev/min	cm³/1000 strokes	rev/min	control rod travel mm
LDA	0,7 bar 207,0-211,0 (204,0-214,0)	1040-1050*	LDA 600 LDA 500	0,7 bar 194,0-200,0 (191,0-203,0) 139,0-145,0 (136,0-148,0)	100	220,0-270,0 / 20,0-21,0 mm RW	-	-	-

Checking values in brackets

\* 1 mm less control rod travel than col. 2

B15

5.82

BOSCH

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B15

## D. Adjustment Test for Manifold Pressure Compensator

-2-

SCA 11,0 u 5

Test at n = 500 rev/min decreasing pressure - in bar gauge pressure  
increasing

Pump/governor	Setting	Gauge pressure =	bar	Measurement	bar	Control rod travel-mm	diminution-difference (1)
PE6P ..RS7001 with ..PA472 R	0,7			0		12,3 - 12,4	
				0,45		11,3 - 11,4	
				0,38		12,0 - 12,1	
						11,5 - 11,7	

Notes:

(1) when n =

rev/min and  
gauge pressure =

bar (= maximum full-load control rod travel)

B16

En

Testoil-ISO 4113

B16

①

# Test Specifications Fuel Injection Pumps ① and Governors

40

WPP 001/4 SCA 14,2 a

5. Edition

En

PE 8 P 120 A 920/4 LS 7002 RQV 250-1000 PA 512

supersedes

5.82

1 - 2 - 7 - 3 - 4 - 5 - 6 - 8 - je  $45^\circ \pm 0,5$  ( $\pm 0,75^\circ$ )

company

Scania

engine

DS14

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

from FD 141:  
Port closing at prestroke5,0-5,1  
(4,95-5,15)to FD 052:  
mm (from BDC)4,4 - 4,5  
(4,35-4,55)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
700	13,2+0,1	21,2 - 21,4	0,5(0,9)			3,3 ± 0,1
225	4,7-4,9	1,4 - 1,7	0,5(0,8)			(3,0 - 3,5)
1000	13,2+0,1	C, col. 4 u. 5				
500	11,3+0,1					

Adjust the fuel delivery from each outlet according to the values in [ ]

## B. Governor Settings

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel		1	
Degree of deflection of control lever	rev/min	Control rod travel mm	1a	Degree of deflection of control lever	rev/min	Control rod travel mm	4	Degree of deflection of control lever	rev/min	Control rod travel mm	3	Sliding sleeve travel 1
1	2	3	2a	4	5	6	7	8	9	10	11	
max.	1000	15,2-17,8		-	-	-	ca. 10	100	min. 6,4	200	1,0-1,2	
ca. 60	12,2	1040-1050						225	4,7-4,9	470	3,3-3,8	
	4,0	1140-1170								730	5,1-5,3	
	1300	0 - 1,0						255-365		1000	7,7	
							3a					

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F). ②		Rotational-speed limitation intermediate speed ③	Fuel delivery characteristics ⑤a high idle speed ⑤b		Starting fuel delivery Idle switching point ⑥		Torque-control travel ⑤
rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	Control rod travel mm
1	2	3	4	5	6	7	8
LDA	0,7 bar	1040-1050*	LDA	0,7 bar	100	230,0-280,0	-
700	212,0-214,0 (209,0-217,0)		1000	222,0-230,0			-
			LDA	0 bar	225	14,0- 17,0	
			500	144,0-148,0 (141,0-151,0)			

Checking values in brackets

\* 1 mm less control rod travel than col. 2

Testoil-ISO 4113

B17

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6.82

B17

## D. Adjustment Test for Manifold Pressure Compensator

-2-

Test at n =

rev/min decreasing pressure - in bar gauge pressure

SCA 14,2 a

Pump/governor	Setting	Measurement	Control rod travel-dimension difference mm (1)
	Gauge pressure = bar	Gauge pressure = bar	
..LS 7002	0,7	0	13,2 - 13,3
RQV..PA 512		0,29	11,3 - 11,4
		0,38	12,0 - 12,2
			12,5 - 12,6

Notes:

(1) when n =

rev/min and  
gauge pressure =

bar (= maximum full-load control rod travel)

Due to smoothing of the sealing edge, the initial spring tension with a new delivery-valve holder must be adjusted to 3,0 mm.

B18

B18 En

Testoil-ISO 4113

① **Test Specifications  
Fuel Injection Pumps ①  
and Governors**

**40**

WPP 001/4 SCA 14,2 a 2  
1. Edition

En

PE 8 P 120 A 920/4 LS 7002      RQV 200-950 PA 547

1 - 2 - 7 - 3 - 4 - 5 - 6 - 8 je  $45^\circ \pm 0,5^\circ (\pm 0,75^\circ)$

supersedes  
company  
engine

Scania  
DSC 1401  
LKW T 142

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

**A. Fuel Injection Pump Settings**

from FD 141: 5,0 - 5,1 mm (from BDC)  
Port closing at prestroke (4,95-5,15) to FD 052: 4,4 - 4,5 mm  
(4,35-4,55)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
950	13,8+0,1	20,6-21,4	0,5(0,9)			3,3 ± 0,1 (3,0 - 3,5)
225	4,4-4,6	0,8- 1,2				

Adjust the fuel delivery from each outlet according to the values in

Testoil-ISO 4113

**B. Governor Settings**

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel		
Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm	
1	2	3	2a	4	5	4	8	9	10	11	
max.	1070	15,2-17,8		-	-	-	ca.9	100	min.6,0	150	0,5-0,8
ca.59	12,8 4,0 1250	990-1000 1115-1145 0 - 1,0	2a 4 3a	5 6	6	4	225 310-370 = 2,0	4,4-4,6 2,0	420 680 950	2,9-3,4 4,7-4,9 7,1	

Torque control travel a =  mm

**C. Settings for Fuel Injection Pump with Fitted Governor**

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed	Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point	Torque-control travel		
rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm
1	2	3	4	5	6	7	8	9
LDA 950	0,7 bar 206,0-214,0 (204,0-216,0)	990-1000*	LDA 700 LDA 500	0,7 bar 202,0-204,0 (199,0-207,0) 0 bar 166,0-170,0 (163,0-173,0)	100	230,0-280,0 / 20,0 - 21,0 mm RW	-	-

Checking values in brackets

\* 1 mm less control rod travel than col. 2

B21

6.82

321

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## D. Adjustment Test for Manifold Pressure Compensator

-2-

Test at n = 500 rev/min decreasing pressure - in bar gauge pressure increasing

SCA 14,2 a 2

Pump/governor	Setting	Measurement	Control rod travel- diminution difference (1)
	Gauge pressure = bar	Gauge pressure = bar	mm
PE8P..LS 7002 with..PA 547	0,38		13,4 - 13,5
		0,7	13,8 - 13,9
		0	12,2 - 12,3
		0,26	12,5 - 12,7

Notes:

(1) when n =

rev/min and  
gauge pressure =

bar (= maximum full-load control rod travel)

B22

B22 En

Testoil-ISO 4113

# ① Test Specifications Fuel Injection Pumps ① and Governors

40

WPP 001/4 SCA 11,0 u 6

1. Edition

En

PE 6 P 120 A 720 RS 7001

RQV 200-1000 PA 539

supersedes

company: Scania

DS 11 (1)

DSC 1101 (2)

Values only apply to test nozzle-and-holder assembly 1 688 901 019 and fuel-injection test tubing 1 680 750 067.  
 All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers.

## A. Fuel Injection Pump Settings

FROM FD 141: 5,0 - 5,1 mm (from BDC)  
 Port closing at prestroke (4,95 - 5,15) mm (from BDC) to FD 052: 4,4 - 4,5 mm  
 (4,35 - 4,55)

Rotational speed rev/min 1	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Difference cm³/ 100 strokes 4	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Spring pre-tensioning (torque-control valve) mm 6
700	13,2+0,1	20,1 - 20,3	0,5(0,9)			3,3 ± 0,1
	4,2-4,4	1,1 - 1,4	0,3(0,6)			(3,0 - 3,5)

Adjust the fuel delivery from each outlet according to the values in

## B. Governor Settings (1)

Upper rated speed Degree of deflection of control lever 1	Control rod travel mm 2	Control rod travel mm 3	Intermediate rated speed Degree of deflection of control lever 4			Lower rated speed Degree of deflection of control lever 7	Control rod travel mm 9	Sliding sleeve travel mm 10	Control rod travel mm 11
			5	6	4				
max.	1000	15,2-17,8	-	-	-	ca.10	100	min.5,8	150
ca.62	12,2 4,0 1300	1040-1050 1145-1175 0 - 1,0				255-365	225	4,2-4,4	430 720 1000
						(3a)			3,0-3,5 5,0-5,2 7,7

Torque control travel a =  mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed 3	Fuel delivery characteristics high idle speed 5a 5c		Starting fuel delivery Idle switching point 6		Torque-control travel Control rod travel 5 mm 8	Control rod travel mm 9
rev/min 1	cm³/1000 strokes 2	rev/min 4a	rev/min 4	cm³/1000 strokes 5	rev/min 6	cm³/1000 strokes 7	rev/min 8	rev/min 9
LDA	0,7 bar	1040-1050*	LDA	0,7 bar	100	220,0-270,0	-	-
700	201,0-203,0 (198,0-206,0)		1000 LDA 500	201,0-209,0 (199,0-211,0) 0 bar 166,0-170,0 (163,0-173,0)		/ 20,0- 21,0 mm RW		

Checking values in brackets

\* 1 mm less control rod travel than col. 2

**B. Governor Settings**

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel						
Degree of deflection of control lever	rev/min	Control rod travel mm	1a	Degree of deflection of control lever	rev/min	Control rod travel mm	4	Degree of deflection of control lever	rev/min	Control rod travel mm	3	rev/min	mm	1	
1	2	3	2a	4	5	6	4	7	8	9	3	10	11	1	
max.	1070	15,2-17,8	-	-	-	-	ca.9	100	min.6,0	150	0,5-0,8	225	4,3-4,5	430	3,0-3,5
ca.61	12,8 4,0 1300	1040-1050 1150-1180 0 - 1,0	(3a)					310-370 = 2,0		720	5,0-5,2		1000	7,7	

Torque control travel a = mm

**C. Settings for Fuel Injection Pump with Fitted Governor**

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed		Fuel delivery characteristics high idle speed		Starting fuel delivery Idle switching point		Torque-control travel	
rev/min	cm³/1000 strokes	rev/min	4a	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm
1	2	3	4a	4	5	6	7	8	9
LDA	0,7 bar	1040-1050*		LDA	0,7 bar	100	220,0-270,0		
700	215,0-217,0 (212,0-220,0)			1000	219,0-227,0 (217,0-229,0)		/ 20,0 to 21,0 mm RW		
				LDA	0 bar				
				500	165,0-169,0 (162,0-172,0)				

Checking values in brackets

\* 1 mm less control rod travel than co: 2

**D. Adjustment Test for Manifold Pressure Compensator**

Test at n = 500 rev/min decreasing pressure - in bar gauge pressure increasing

Pump/governor	Setting	Measurement	Control rod travel-dimension difference
	Gauge pressure = bar	Gauge pressure = bar	mm
PE 6 P..RS 7001 with ..PA 539	(1). 0,44	0,7 0 0,28	12,8 - 12,9 13,2 - 13,3 11,6 - 11,7 12,0 - 12,2
	(2) 0,48	0,7 0 0,3	13,3 - 13,4 13,8 - 13,9 11,7 - 11,8 12,2 - 12,4

En

①

# Test Specifications Fuel Injection Pumps ① and Governors

40

WPP 001/4 VOL 7,0 k 2

1. Edition

En

PE 6 P 110 A 320 RS 423

RQV 250-1150 PA 435

supersedes

company

Volvo

engine

TD 70 G

130 kW

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke  
3,0-3,1  
(2,95-3,15) mm (from BDC)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
700	10,0+0,1	8,6-8,8	0,4(0,8)			2,5 ± 0,1
250	4,5-4,7	0,9-1,3				(2,2 - 2,9)

Adjust the fuel delivery from each outlet according to the values in □

Testoil-ISO 4113

## B. Governor Settings

Upper rated speed			Intermediate rated speed				Lower rated speed			Sliding sleeve travel			
Degree of deflection of control lever	rev/min	Control rod travel mm	①	Degree of deflection of control lever	rev/min	Control rod travel mm	④	Degree of deflection of control lever	rev/min	Control rod travel mm	③	① rev/min mm	
1	2	3	②a	4	5	6	④	7	8	9	③	10 11	
max.	1150	15,2-17,8		-	-	-		ca. 10	100	min. 6,0	200	1,1-1,4	
									250	4,5-4,7	520	3,5-3,7	
ca. 66	9,0	1190-1200								830	5,1-5,3		
	4,0	1260-1290								380-440	= 2,0	1150	8,0
	1350	0 - 1,0											

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)			Rotational-speed limitation intermediate speed		Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point		Torque-control travel	
rev/min	cm³/1000 strokes	②	rev/min	④a	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	⑥	⑤
1	2	3	4	5	6	7	8	9	⑧	⑨
LDA 70G	0,7 bar 86,0-88,0 (83,0-91,0)		1190-1200	LDA 700	0 bar 77,0-80,0 (74,0-83,0)		100	140,0-170,0 / 20,0-	-	-
							250	21,0 mm RW 11,0-15,0		

Checking values in brackets

\* 1 mm less control rod travel than col. 2

5.82

C3

BOSCH

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C3

## D. Adjustment Test for Manifold Pressure Compensator

-2-

Test at n = 500 rev/min decreasing pressure - in bar gauge pressure increasing

VOL 7,0 k 2

Pump/governor	Setting	Measurement	Control rod travel-dimension difference mm (1)
	Gauge pressure = bar	Gauge pressure = bar	
PE 6 P .. RS 423 with ..PA 435	0,7	0	10,0 - 10,1
		0,36	9,5 - 9,6
		0,33	9,8 - 9,9
			9,6 - 9,7

Notes

(1) when n =

rev/min and  
gauge pressure =

bar (= maximum full-load control rod travel)

C4

Testoil-ISO 4113

En

C4

# Test Specifications Fuel Injection Pumps and Governors

40

WPP 001/4 VOL 6,0 f

7. Edition

En

PES 6 MW 100/320 RS 11      0 413 206 002  
 RMW 300---1400 MW 18      0 420 093 010

supersedes 6.81  
 company Volvo  
 engine D 60 A

1 - 5 - 3 - 6 - 2 - 4 = 0 - 60-120-180-240-300 ±0,5 (0,75°)

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke      2,40-2,50  
 (2,35-2,55)      mm (from BDC)      9 - 12mm      Control rod travel

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1400	9,0-9,2	7,6 - 7,8	0,3(0,15)			
300	5,7-5,9	1,7 - 1,9	0,3(0,5)			
Sect. C, col. 4,5			0,3(0,5)			

Set uniform delivery according to the values in  

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Rotational speed rev/min	Control rod travel mm	
1	2	3	4	5	6	7	8	9
20	1 2 3 4 5	8,5 5,7-5,9 ** - 0 - 1,0	100 300 325 - 540	78±4 7 8 9 10 11	9,0-9,2 8,1 4,0 0,1-1,0	1400 1400-1450 1500-1520 1610 -	12 13 14 6	100 1300 1200 1050 100-230(80-250)
								20,5-21,5 9,0- 9,2 9,1- 9,3 9,7- 9,9
								Switching point

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery Test oil temp. 40°C (104°F)		19	Full-load speed regulation	8a	Variations in fuel delivery	17 18	Starting fuel delivery idle	Difference	
rev/min	cm³/1000 strokes	3	rev/min	4	rev/min	5	rev/min	cm³/1000 strokes	8
1400	76,0-78,0 (75,0-79,0)	1440-1450* (1435-1455)	600		63,5-66,5 (62,5-67,5)	100 300	mind. 140 17,0-19,0 (16,0-20,0)	3,0 ( 5,0)	12a 15 16

Checking values in brackets

less control rod travel than in Column 2

5.82

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C11

(44)

1. Idle stage  
4.0 + 0.25 mm
2. \*\* At this speed, set auxiliary idle spring such that contact is made.  
There must be no influence on idle delivery.
3. Control-rod travel of approx. 1 mm must be obtained when stopped.  
Check following adjustment of locking speed.

C12

En

C12

⑤

# Test Specifications Fuel Injection Pumps and Governors

40

WPP 001/4 MB 2,4 f

9. Edition

En

PES 4 MW 55/320 RS 14  
RW 375/2200 MW 21

supersedes  
company  
engine

2.79  
Daimler-Benz  
OM 616-USA

$1 - 3 - 4 - 2 = 0 - 90-180-270^\circ \pm 0,5^\circ (0,75^\circ)$

Note: Before starting testing, observe the  
important instructions on the reverse. See point 3!

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers.

## A. Fuel Injection Pump Settings

Port closing at prestroke

1,70 - 1,80  
(1,65 - 1,85)

mm (from BDC)

21 mm Control rod travel

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	13,1-13,2	3,75-3,85	0,25(0,3)			
375	6,6-6,8	0,65-0,75	0,10(0,15)			
1600/2180	Sect. C, col. 4,5		0,25(0,30)			

Set uniform delivery according to the values in

Checking values in brackets

## B. Governor Settings

without altitude-pressure compensator

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	7	8	9
1	2	3	4	5	6			
30	① min.11 ② 6,6-6,8 ③ ** ④ - ⑤ max. 2	100-300 375 385 - 650-700	67±2	⑦ 12,4-12,6 ⑧ 11,5 ⑨ 4,0 ⑩ 0 - 1,0 ⑪	2180 2280-2300 2670-2730 2950 -		⑫ 100 ⑬ 1600 ⑭ 1000 ⑮ 2180 ⑯	20,5-21,5 12,8-13,0 13,1-13,2 12,4-12,6 Switching point 270-320(250-340)

without altitude-pressure compensator

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery		⑲	Full-load speed regulation	⑳	Variations in fuel delivery	⑷	Starting fuel delivery Idle	⑵	Difference
Test oil temp. 40°C (104°F)	rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	⑶	rev/min	cm³/1000 strokes	cm³/1000 strokes
1	2	3	4	5	6	7	8	9	10
2180	39,0-42,0 (38,0-43,0)	2280-2300* (2275-2305)	1600	39,0-41,0 (38,0-42,0)	100	mind.56,0	6,0	⑾	⑿
			1000	37,5-38,5 (36,5-39,5)	375	6,5-7,5 (6,0-8,0)	1,0	⑿	⑿
					2550	14,5-20,5 (13,5-21,5)	2,5	⑿	⑿
							3,0	⑿	⑿

Checking values in brackets

less control rod travel than in Column 2

C15

7.79

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C15

1. Testing of sections A, B and C should be done without the ADA aneroid box. When this test has been completed the ADA aneroid box is connected.

Testing the governor with ADA-aneroid box (147)

Engine speed	Setting point	Control-rod travel reduction from full-load control-rod travel
1000 min <sup>-1</sup>	840 mbar (630 mm Hg)	0.9-1.1 (0.85-1.15) mm
	<b>Checking point</b>	
1000 min <sup>-1</sup>	913 mbar (685 mm Hg)	0.1 - 0.5 (0.05-0.55) mm

2. Pin projection =  $16.65 \pm 0.05$  mm.

3. Adjusting the idle stage

Text replaces section 4.1 of the test instructions.

Set the control lever to 30°.

Operate the fuel-injection pump at  $n = 800 \text{ min}^{-1}$ .

Screw the spring retainer (torque-control capsule) or the driver with a pin wrench KDEP 1064/1 or a 1/2" hexagon-socket-screw-key so far that a control-rod travel of 1.2 - 1.5 mm is attained.

Further test steps see Test Instructions VDT-W-420/300 En.

4. ++ At this engine speed exceed the control-rod travel by 0.4 + 0.1 mm. Idle delivery must not be affected.

5. Adjustment angle: Stop ... idle = 35°, idle ... full load = 39°.

6. Sensing lever adjustment: Set the sensing lever at  $n = 375 \text{ min}^{-1}$  (control lever in full-load position). At this speed the control-rod travel must exceed the full-load control-rod travel at  $n = 1000 \text{ min}^{-1}$  by 0.2 - 0.5 (0.1 - 0.6 mm) mm.

7. Check the pneumatic shut-off

Control lever in idle position. Operate the fuel-injection pump at  $n = 375 \text{ min}^{-1}$ .

At  $p_{\text{u}} = 450 \text{ mbar (338 mm Hg)}$  (vacuum) the control-rod must quickly return to control-rod travel 0 mm.

# ③ Test Specifications Fuel Injection Pumps and Governors

40

WPP 001/4 MB 3,0 h

3. Edition

En

PES 5 MW 55 / 320 RS 12  
RW 350/2200 MW 26

supersedes  
company  
engine

11.77  
Daimler-Benz  
OM 617

1 - 2 - 4 - 5 - 3 - = 0 - 72 - 144 - 216 - 288 ± 0,5° (0,75°)

See page 2

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke 1,70-1,80 mm (from BDC) 21 mm Control rod travel  
(1,65-1,85)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	16
1000	13,5+0,1	3,75-3,85	0,25(0,3)			
350	6,4-6,6	0,65-0,75	0,10(0,15)			
1600/2180	Sect. C, col. 4,5		0,25(0,3)			

Set uniform delivery according to the values in [ ]

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	7	8	9
1	2	3	4	5	6			
30	(1) min.11 (2) 6,4-6,6 (3) ** (4) - (5) max.2	100-250 350 360 - 650-700	68±4	(7) 12,3-12,5 (8) 11,4 (9) 4,0 (10) 0-1,0 (11) -	2180 2280-2300 2670-2730 2950 -	(12) 100 (13) 1600 (14) 1000 (15) 2180 (6) Switching point 270-320(250-340)	100 1600 1000 2180 270-320(250-340)	20,5-21,5 12,9-13,1 13,5-13,6 12,3-12,5 -

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery		(19)	Full-load speed regulation	(8a)	Variations in fuel delivery	(17)	Starting fuel delivery Idle		Difference
Test oil temp. 40°C (104°F)	rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes
1	2	3	4	5	6	7	8	9	10
2180	39,0-41,0 (38,0-42,0)	2280-2300* (2275-2305)	1600 1000	39,0-41,0 (38,0-42,0) 37,5-38,5 (36,5-39,5)	100 350 1550	mind.56,0 6,5-7,5 (6,0-8,0) 14,5-20,5 (13,5-21,5)	6,0 1,0 (1,5) 2,5 (3,0)	(12a) (15) (16)	

Checking values in brackets

less control rod travel than in Column 2

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Notes:

1. Guide-sleeve idle travel  $6.75 + 0.25$  mm
2. \*\* At this speed, override control-rod travel by  $0.4 + 0.1$  mm.  
There must be no influence on idle delivery.
3. Sensing-lever setting: at  $n = 1000 \text{ min}^{-1}$ , max. 0.5 mm control-rod travel may be subtracted with the sensing lever.  
(Adjustment aid for fuel-delivery characteristics)
4. Idle - full load = 34 - 42 degrees advance-angle range must be complied with.
5. Pneumatic shut-off device:  
  
Control lever in idle position. Drive fuel-injection pump with  $n = 350 \text{ min}^{-1}$ . Control rod must rapidly assume 0 mm control-rod travel at  $P = 450 \text{ mbar}$  (338 mmHg) (vacuum).

# Test Specifications Fuel Injection Pumps and Governors

VDT-WPP 001/4 MB 3,0 e

4. Edition

En

PES 5 MW 55/320 RS 12 RW 250/2200 MW 20

supersedes 8.77

Cam sequence and angular spacing:

company Daimler-Benz  
engine OM 617 (Sweden)

1-2-4-5-3--0-72-144-216-288° See page 2

Angular cam spacing tolerance ±0,5 (0,75°)

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke

1,7-1,8  
(1,65-1,85)

mm (from BDC)

21,0mm

Control rod travel

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	13,5	3,75-3,85	0,25(0,3)			
350	+ 0,1 6,5 ± 0,1	0,65-0,75	0,1(0,15)			
1600 2180) --	Sect. C, col. 4,5		0,25(0,3)			

Set uniform delivery according to the values in  

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	7	Rotational speed rev/min	Control rod travel mm
1	2	3	4	5	6		8	9
30	1 2 3 4 5	min. 11 6,4-6,6 ** - - - max. 2	150-220 350 360 -- 650-700	68± 7 8 9 10 11	12,4-0,1 11,4 4,0 max. 1	2180 2280-2300 2670-2730 2850-2950	12 13 14 6	100 1600 1000 2180 Switching point 270-320 (250-340)
								20,5-21,5 12,9-13,1 13,5-13,6 12,3-12,5

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery		19	Full-load speed regulation		8a	Variations in fuel delivery		17	Starting fuel delivery Idle		Difference cm³/1000 strokes
Test oil temp. 40°C (104°F)	rev/min		cm³/1000 strokes	rev/min		rev/min	cm³/1000 strokes		rev/min	cm³/1000 strokes	
1	2	3	4	5	6	7	8	9	10	11	12
1000	37,5-38,5 (36,5-39,5)	2280-2300*	1600	39,0-41,0 (38,0-42,0)	100	min. 56,0	6,0	12a			
		(2275-2305)	2180	39,0-41,0 (38,0-42,0)	350	6,5-7,5 (6,0-8,0)	1,0	15			
					2550	14,5-20,5 (13,5-21,5)	1,5				
						2,5	3,0	18			

Checking values in brackets

less control rod travel than in Column 2

2.79

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C19

C19

Note:

1. Sleeve idle-speed travel =  $6.75 + 0.25$  mm
2. Advance-angle range, idle speed to full-load =  $34 \dots 42^\circ$
3. \*\* (3) At this rotational speed applying force, increase the control-rod travel by  $0.4 + 0.1$  mm. In doing so, the idle delivery must not be affected!
4. With  $n = 1000 \text{ min}^{-1}$  (speed-control lever in full-load position), the control-rod travel can be reduced by a max. of 0.5 mm using the sensing pin.  
(Fuel delivery adjustment aid.)
5. Test the pneumatic cut-off:  
Control lever in the idle position. Drive the injection pump at  $n = 350 \text{ min}^{-1}$ . At  $p_u = 450$  bar (338mm Hg) (vacuum), the control rod must quickly return to the travel position 0 mm.

⑤

# Test Specifications Fuel Injection Pumps and Governors

40

WPP 001/4 MB 2,4 g

2. Edition

En

PES 4 MW 55/320 RS 17  
 RW 375/2250 MW 23 (MW 24)  
 $1-3-4-2 = 0-90-180-270^\circ \pm 0,50^\circ (0,75^\circ)$   
 See page 2

supersedes 10.77  
 company Daimler-Benz  
 engine OM 616

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke 1,70-1,80 mm (from BDC) 21 mm Control rod travel  
 (1,65-1,85)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1000	13,4±0,1	3,75-3,85	0,25(0,3)			
375	6,6±0,1	0,65-0,75	0,1 (0,15)			
1600/2200	-Sect. 0, col. 4,5		0,25(0,3)			

Set uniform delivery according to the values in

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	7	Rotational speed rev/min	Control rod travel mm
1	min. 11 6,5-6,7 ** -	100-300 375 385 -	68±4	7 8 9 10 11	12,7-12,9 11,8 4,0 0-1,0	2200 2330-2350 2750-2840 2950	12 13 14 15 16	100 1600 1000 2200 Switching point 270-320(250-340)
2	max. 2	650-700						

Testoil-ISO 4113

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery		19	Full-load speed regulation	8a	Variations in fuel delivery	17	Starting fuel delivery Idle		Difference
Test oil temp. 40°C (104°F)	rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	18	rev/min	cm³/1000 strokes	cm³/1000 strokes
	1	2		3	4	5	6	7	8
	2200	39,5-41,5 (38,5-42,5)	2330-2350*	1600	39,5-41,5 (38,5-42,5)	100	mind. 53,0	6,0	12a
			(2325-2355)	1000	37,5-38,5 (36,5-39,5)	375	6,5-7,5 (6,0-8,0)	1,0	15
						2600	14,5-20,5 (13,5-21,5)	2,5	16
								(3,0)	

Checking values in brackets

less control rod travel than in Column 2

C21

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2.79

C21

Notes:

1. Idle guide-sleeve travel =  $6.75 + 0.25$  mm
2. Idle - full load advance-angle range  $34 - 42^\circ$
3. Sensing-lever setting: set lever at  $n = 1000 \text{ min}^{-1}$ .  
Control lever in full-load position.
- 4 \*\* At appropriate speed, override control-rod travel by  
 $0.4 + 0.1$  mm; there must be no effect on idle delivery.
5. Test pneumatic shut-off:  
Control lever in idle position. Run fuel-injection pump at  
 $n = 375 \text{ min}^{-1}$ . Control rod must rapidly assume 0 mm  
control-rod travel at  $P_u = 450 \text{ mbar}$  (338 mmHg) (vacuum).

⑤

# Test Specifications Fuel Injection Pumps and Governors

40

VDT-WPP 001/4 MB 3,0d

6. Edition

En

PES5MW55/320RS12

RW350/2200 MW15

supersedes  
company  
engine

2.79  
Daimler-Benz  
OM 617

Cam sequence and angular spacing: See page 2!  
1 - 2 - 4 - 3 = 0-72-144-216-288°

Angular cam spacing tolerance  $\pm 0,50^\circ$  ( $\pm 0,75^\circ$ )

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke

1,7 - 1,8  
(1,65- 1,85)

mm (from BDC)

21,0mm

Control rod travel

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	13,5	3,75-3,85	0,25(0,3)			
350	+ 0,1 6,5 $\pm 0,1$	0,65-0,75	0,1 (0,15)			
1600 2180	Sect. C, col. 4,5	-	0,25(0,3)	.	.	.

Set uniform delivery according to the values in

Checking values in brackets

Testoil-ISO 4113

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Rotational speed rev/min	Control rod travel mm	
1	2	3	4	5	6	7	8	9
30	1 2 3 4 5	min.11 6,4-6,6 ** - max. 2	150-220 350 360 - 650-700	68±4 7 8 9 10 11	12,4±0,1 11,4 4,0 max.1,0	2180 2280-2300 2670-2730 2850-2950	100 1600 1000 2180 Switching point 270-320(250-340)	20,5-21,5 12,9-13,1 13,5-13,6 12,3-12,5

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery		(19)	Full-load speed regulation	(8a)	Variations in fuel delivery	(17)	Starting fuel delivery idle		Difference
Test oil temp. 40°C (104°F)	rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes
1	2	3	4	5	6	7	8	9	8
1000	37,5-38,5 (36,5-39,5)	2280-2300* (2275-2305)	1600	39,0-41,0 (38,0-42,0)	100	mind.57,0	6,0	(12a)	
			2180	39,0-41,0 (38,0-42,0)	350	6,5 - 7,5 (6,0 - 8,0)	1,0	(1,5)	
					2550	14,5 - 20,5 (13,5 - 21,5)	2,5	(3,0)	(15)
									(16)

Checking values in brackets

less control rod travel than in Column 2

C23

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5.82

C23

Note:

1. Sleeve idle-speed travel =  $6.75 + 0.25$  mm
2. Advance-angle range, idle speed to full-load =  $34 \dots 42^\circ$
3. \*\* (3) At this rotational speed applying force, increase the control-rod travel by  $0.4 + 0.1$  mm. In doing so, the idle delivery must not be affected!
4. With  $n = 1000 \text{ min}^{-1}$  (speed-control lever in full-load position), the control-rod travel can be reduced by a max. of 0.5 mm using the sensing pin.  
(Fuel delivery adjustment aid.)
5. Test the pneumatic cut-off:  
Control lever in the idle position. Drive the injection pump at  $n = 350 \text{ min}^{-1}$ . At  $p_u = 450$  bar (338mm Hg) (vacuum), the control rod must quickly return to the travel position 0 mm.

# Test Specifications Fuel Injection Pumps and Governors

En

PES 5 MW 55/320 RS 4

RW 350/2200 MW 11

supersedes  
company  
engine

7.77  
Daimler-Benz  
OM 617

Cam sequence and angular spacing:

1 - 2 - 4 - 5 - 3 = 0 - 72 - 144 - 216 - 288° ± 0,5° (± 0,75°)

See page 2!

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke

1,7 - 1,8 mm (from BDC)  
(1,65- 1,85)

Control rod travel

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
2180	12,1	3,7 - 3,8	0,25(0,3)			
350	6,5 (±0,1)	0,6 - 0,7	0,1 (0,15)			
1600 1000	- Sect. C, col. 4,5		- 0,25(0,3)			

Set uniform delivery according to the values in

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm		Rotational speed rev/min		Degree of deflection of control lever		Rotational speed rev/min	Control rod travel mm
1	2	3	4	5	6	7	8	9
30	1 2 3 4 5	min.11 6,5 ** - max. 2	150-220 340-360 360 ---	ca.68 (± 4)	7 8 9 10 11	12,1 11,1 6,8 max.1	2180 2280-2300 2520-2580 2800-2950	100 1600 1000 Switching point *** ./. 12 13 14 6
./.								20,5-21,5 12,4-12,6 12,8-13,0

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery		19	Full-load speed regulation	8a	Variations in fuel delivery		17	Starting fuel delivery idle	18	Difference
Test oil temp. 40°C (104°F)	rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	6	rev/min	cm³/1000 strokes	7	cm³/1000 strokes
1	2	3	4	5	6	7	8	9	10	11
2180	37,5-38,5 (36,5-39,5)		2280-2300* (2275-2305)	1600 1000	38,0-40,0 (37,0-41,0) 35,0-37,0 (34,0-38,0)	100	min.57	6,0	12a	
						350	6,5-7,5 (6,0-8,0)	1,0	15	
							2520-2580:15,5-17,5 (14,5-18,5)(3,0)	2,5	16	

Checking values in brackets

less control rod travel than in Column 2

5.82

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Extended text in VDT-WPP 211/7.

Section 4

To be given consideration prior to text for 4.13:

Set pointer plate (2) to "12 000 ft".

To be given consideration after text for 4.13:

Set pointer plate (2) to "0 ft".

Check switching point and compare to set value in test specification sheet.

At speed "0" and pointer plate (2) set to "12 000 ft", moving control lever forwards must cause starting control-rod travel (12) to be attained.

Section 6

To be given consideration following text for 2nd expanded text:

Check change in control-rod travel per detent position = 0.5 - 0.7 mm.

Test specification sheet MB 3.0 b - front -

Idle guide-sleeve travel = 6.75 + 0.25 mm

Idle:full load = 34 - 42° adjustment range must be complied with!

Load pick-up (increase in control-rod travel) when idling with  
 $n = 350 - 150 \text{ min}^{-1}$  must be between 4 - 5 mm control-rod travel!

Re (3) setting auxiliary idle spring \*\*

At this speed, override control-rod travel by 0.4+0.1 mm; there must be no effect on idle delivery!

Re (6) switching point \*\*\*

Setting 300 - 320 (280 - 340)  $\text{min}^{-1}$  with reduced-delivery stop set to "12 000 ft".

Test max. 310  $\text{min}^{-1}$  in "0 ft" setting of reduced-delivery stop

# Test Specifications Fuel Injection Pumps and Governors

40

WPP 001/4 MB 3,0 1

3. Edition

En

PES 5 M 55 C 320 RS 105 RSF 350/2300 M 9	0 400 075 999	0 400 075 997	supersedes company engine	11.79 Daimler-Benz OM 617
PES 5 M 55 C 320 RS 105 RSF 350/2300 M 10	0 400 075 998	0 400 075 996	See page 2!	

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke      1,70-1,80  
(1,65-1,85)      mm (from BDC)      20,0mm      Control rod travel

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	13,9+0,1	3,85 - 3,95	0,25(0,3)			
350	6,8-7,0	0,6 - 0,7	0,1 (0,15)			
1600	***		0,25(0,3)			
2200	***		0,25(0,3)			
				***	Sect. C, col. 4,5	

Set uniform delivery according to the values in  

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	7	Rotational speed rev/min	Control rod travel mm
1	2	3	4	5	6		8	9
9-13 (1)	10,5	250-300	50 (7)	13,0-13,2	2200		(12) 100	min.20,3
(2)	6,8-7,0	350	(8) 9,5-9,9	2550		(13) 1600	13,6-13,8	
(3)	**	370	(9) -	-		(14) 1000	13,9-14,0	
(4)	-	-	(10) 0,0-1,0	2950		(6) Switching point		
(5)	2,5	720-820	(11) -	-				

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery		19	Full-load speed regulation		8a	Variations in fuel delivery		17	Starting fuel delivery		Difference cm³/1000 strokes
Test oil temp. 40°C (104°F) rev/min	cm³/1000 strokes		rev/min	rev/min		rev/min	cm³/1000 strokes		rev/min	cm³/1000 strokes	
1	2	3	4	5	6	7	8	9	10	11	12
2200	40,0-42,0 (39,0-43,0)	2550*	RW=9,5-9,9	1600	39,5-41,5 (38,5-42,5)	100	min.52,0	6,0	350	6,0-7,0 (5,5-7,5)	1,0 (1,5)
				1000	38,5-39,5 (37,5-40,5)	2550	23,5-27,5 (22,5-28,5)	2,5 RW- (3,0) See Point 8 a			2,5 RW- (3,0) See Point 8 a

Checking values in brackets

\*3,4 less control rod travel than in Column 2

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1. Angular cam spacing:

$$1 - 2 - 4 - 5 - 3 = 0 - 72 - 144 - 216 - 288 \pm 0,5 \text{ (0,75)}$$

\*\*

2. Auxiliary idle spring is to be adjusted at  
 $n = 370 \text{ min}^{-1}$  that the control-rod travel  
is exceeded by 0.1 - 0.2 mm.

3. Setting the idle control-lever position:

$$n = 1000 \text{ min}^{-1}, \text{ control travel } 1.9 - 2.0 \text{ mm}$$

4. Checking the auxiliary idle spring shutoff:

Control-lever position =  $45^\circ$ . After the change-over point, the control lever does not alter its position until  $550 \text{ min}^{-1}$ .

Idle control-lever position =  $28^\circ$ . Speed range =  
 $350 - 450 \text{ min}^{-1}$ .

5. Checking the pneumatic shutoff aneroid box:

Lever at idle stop.

At  $n = 375 \text{ min}^{-1}$  and  $p_u = 450 \text{ mbar}$  (vacuum)  
(338 mm Hg) the control rod must return quickly to 0 mm travel position.

# Test Specifications Fuel Injection Pumps and Governors

40

WPP 001/ 4MB 2,4 h 1

3. Edition

En

PES 4 M 55 C 320 RS 104	)	0 400 074 989	0 400 074 984	Supersedes company engine	5.79
RSF 375/2300 M 12	)				Daimler Benz
PES 4 M 55 C 320 RS 104	)	0 400 074 990	0 400 074 983		OM 616
RSF 375/2300 M 11	)				

See page 2!

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke      1,70 - 1,80 mm (from BDC)      20 mm      Control rod travel  
(1,65 - 1,85)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	13,9+0,1	3,85 - 3,95	0,25(0,30)			
375	6,7-6,9	0,7 - 0,8	0,10(0,15)			

Set uniform delivery according to the values in  

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel	Rotational speed rev/min	Rotational speed rev/min	Control rod travel	
1	2	3	4	5	6	7	8	9
11±2	1 2 3 4 5	11,0 6,7-6,9 ** -- 2,5	250-300 375 395 - 720-820	50 7 8 9 10 11	+0,2 13,0 9,5-9,9 - 0 - 1,0 -	2200 2550 - 2950 -	12 13 14 6	100 1600 1000 Switching point
								min. 20,3 13,6-13,8 13,9-14,0

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery Test oil temp. 40°C (104°F)		19	Full-load speed regulation	8a	Variations in fuel delivery	17	Starting fuel delivery Idle	18	Difference
rev/min	cm³/1000 strokes		rev/min		rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	cm³/1000 strokes
1	2		3		4	5	6	7	8
2200	40,0-42,0 (39,0-43,0)		2550*	RW=9,5-9,9	1600 1000	39,5-41,5 (38,5-42,5) 38,5-39,5 (37,5-40,5)	100 375 2550	min. 52,0 7,0-8,0 (6,5-8,5) 23,5-27,5 (22,5-28,5)	6,0 1,0 (1,5) 2,5 See (3,0) Point 8 a
									12a (15) (16)

Checking values in brackets

\*3,5 less control rod travel than in Column 2

4.80

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1. Angular cam spacing:

$$1 - 3 - 4 - 2 = 0 - 90 - 180 - 270 \pm 0,50 (0,75)$$

\*\*

2. Auxiliary idle spring is to be adjusted at  $n = 395 \text{ min}^{-1}$  that the control-rod travel is exceeded by 0.1 - 0.2 mm.

3. Setting the idle control-lever position:

$n = 1000 \text{ min}^{-1}$ , control travel 1.9 - 2.0 mm

4. Checking the auxiliary idle spring shutoff:

Control-lever position =  $45^\circ$ . After the change-over point, the control lever does not alter its position until  $550 \text{ min}^{-1}$ .

Idle control-lever position =  $28^\circ$ . Speed range = 350 - 450  $\text{min}^{-1}$ .

5. Checking the pneumatic shutoff aneroid box:

Lever at idle stop.

At  $n = 305 \text{ min}^{-1}$  and  $p_u = 450 \text{ mbar}$  (vacuum)  
(338 mm Hg) the control rod must return quickly to 0 mm travel position.

1. PES 4 M55C 320 RS 104 RSF 375/2300 M 8	) 0 400 074 994 0 400 074 984	supersedes company	2.79 Daimler Benz
2. PES 4M55 C 320 RS 104 RSF 375/2300 M 7	) 0 400 074 991 0 400 074 983	engine	OM 616

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

#### **A. Fuel Injection Pump Settings**

### Port closing at prestroke

**1,70 - 1,80** mm (from BDC)  
**(1,65 - 1,85)**

Control rod travel  
20 mm

Rotational speed rev/min	Control rod travel mm	Fuel delivery $\text{cm}^3/100 \text{ strokes}$	Difference $\text{cm}^3/100 \text{ strokes}$	Control rod travel mm	Fuel delivery $\text{cm}^3/100 \text{ strokes}$	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	13,9+0,1	3,85-3,95	0,25(0,3)			
375	6,7-6,9	0,7 - 0,8	0,1(0,15)	-		

**Set uniform delivery according to the values in**

### Checking values in brackets

## **B. Governor Settings**

Lower rated speed			Upper rated speed				Variations in control rod travel		
Degree of deflection of control lever	Control rod travel	Rotational speed	Degree of deflection of control lever	Control rod travel	Rotational speed		Rotational speed	Control rod travel	
1	mm	rev/min	4	mm	rev/min	7	rev/min	mm	
11±2	11,0 6,7-6,9 ** 3 -	250 - 300 375 395 - -	50 7 8 9 10 11	13,0+0,2 9,4-9,8 - 0,0-1,0 - -	2200 2550 - 2950 - -		100 1600 13,6-13,8 1000 13,9-14,0 Switching point	min.20,3 13,6-13,8 13,9-14,0	
	2	2,5	720-820						

### **C. Settings for Fuel Injection Pump with Governor Mounted**

### Checking values in brackets

\*3.5 less control rod travel than in Column 2

1. Angular cam spacing:

$$1 - 3 - 4 - 2 = 0 - 90 - 180 - 270 \pm 0,50 (0,75)$$

\*\*

2. Auxiliary idle spring is to be adjusted at  
 $n = 395 \text{ min}^{-1}$  that the control-rod travel  
is exceeded by 0.1 - 0.2 mm.

3. Setting the idle control-lever position:

$n = 1000 \text{ min}^{-1}$ , control travel 1.9 - 2.0 mm

4. Checking the auxiliary idle spring shutoff:

Control-lever position =  $45^\circ$ . After the change-over point, the control lever does not alter its position until  $550 \text{ min}^{-1}$ .

Idle control-lever position =  $28^\circ$ . Speed range =  
 $350 - 450 \text{ min}^{-1}$ .

5. Checking the pneumatic shutoff aneroid box:

Lever at idle stop.

At  $n = 305 \text{ min}^{-1}$  and  $p_u = 450 \text{ mbar}$  (vacuum)  
(338 mm Hg) the control rod must return quickly to 0 mm travel position.

# (5) Test Specifications Fuel Injection Pumps and Governors

40

VDT-WPP 001/4 PEN 6,0 a

3. Edition

En

PES 6 MW 100/320 RS 5 Z RWV 300-1400 MW 4  
See page 2!  
Angular cam spacing tolerance

supersedes  
company  
engine

7.77  
Volvo-Penta  
DAMB 60 A

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke

2,5 - 2,6  
(2,45- 2,65)

mm (from BDC)

10,5mm

Control rod travel

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm <sup>3</sup> /100 strokes	Difference cm <sup>3</sup> /100 strokes	Control rod travel mm	Fuel delivery cm <sup>3</sup> /100 strokes	Spring pre-tensioning (compensating valve) mm
1400	10,6	8,9 - 9,1	0,35(0,6)			
300	(+0,1) 5,1 (±0,1)	0,9 - 1,3	0,35(0,55)			
800	Sect. C, col. 4,5		0,5 (0,7)			

Set uniform delivery according to the values in [ ]

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Rotational speed rev/min	Control rod travel mm	
26	① 8,5-9,5 ② 5,0-5,2 ③ with contact ④ 2,0	100 300 310** 420 - 470	82±4	⑦ 10,6 ⑧ 9,6 ⑨ 4,0 ⑩ max. 1,0	1400 1440-1450 1540-1580 1680 250-350	⑫ 100 ⑬ 1400 ⑭ 800 ⑮ 500 ⑯ 100-220(80-230)	20,5-21,5 10,6-10,7 10,8-11,0 10,1-10,3 Switching point 100-220(80-230)	

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery		19	Full-load speed regulation	8a	Variations in fuel delivery		17	Starting fuel delivery idle	Difference
Test oil temp. 40°C (104°F)		rev/min	cm <sup>3</sup> /1000 strokes	rev/min	rev/min	cm <sup>3</sup> /1000 strokes	rev/min	cm <sup>3</sup> /1000 strokes	cm <sup>3</sup> /1000 strokes
1400	89,9-91,9 (87,9-93,9)		1440-1450*	800	86,8-90,8 (84,8-92,8)	100	max. RW		12a
						300	9,8-13,8 (7,3-16,3)	3,5 (5,5)	15

Checking values in brackets

less control rod travel than in Column 2

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5.82

0/1

D11

Note:

1. Idle guide-sleeve travel =  $4.25 + 0.1$
2. \*\* At this speed, override control-rod travel by  $0.6 \pm 0.1$  mm;  
there must be no effect on idle delivery.
3. Set cut-in point of maximum-speed control spring at  
 $CL = 40 + 5^\circ$ .  
There must be no uncontrolled stage.
4. Starting control-rod travel of approx. 21 mm must be attained  
when stopped.  
(Check following setting of locking speed)

D12

En

D12

# Test Specifications Fuel Injection Pumps and Governors

40

WPP 001/4 MB 2,0 g 2

3. Edition

En

PES 4 M 50 C 320 RS 103 )

RSF 375/2300 M 14 )

0 400 074 987 Sales model

0 400 074 985

supersedes

4.80

company

Daimler-Benz

engine

OM 615

See page 2!

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers.

## A. Fuel Injection Pump Settings

Port closing at prestroke

1,70 - 1,80  
(1,65 - 1,85)

mm (from BDC)

20 mm

Control rod travel

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	11,9+0,1	2,90-3,00	0,25(0,3)			
375	6,9-7,1	0,65-0,75	0,10(0,15)			

Set uniform delivery according to the values in  

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	8	Rotational speed rev/min	Control rod travel mm
1	2	3	4	5	6	7	8	9
13-17 1 2 3 4 5	11,5 6,9-7,1 ** - 2,5	250-300 375 395 - 720-820	50 7 8 9 10 11	11,2+0,2 8,1-8,5 - 0 - 1,0 -	2200 2550 - 2950 -		100min 1600 1000 Switching point	20,3 11,5-11,7 11,9-12,0

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery Test oil temp. 40°C (104°F)		19	Full-load speed regulation rev/min	8a	Variations in fuel delivery rev/min	17	Starting fuel delivery Idle rev/min	18	Difference cm³/1000 strokes	
rev/min	cm³/1000 strokes	3	rev/min	4	cm³/1000 strokes	5	cm³/1000 strokes	6	cm³/1000 strokes	8
2200	31,0-33,0 (30,0-34,0)		2550* RW=8,1-8,5	1600	29,5-31,5 (28,5-32,5) 29,0-30,0 (28,0-31,0)		100	min. 54,0	6,0	12a
							375	5,4-7,5 (6,0-8,0) 17,5-21,5 (16,5-22,5)	1,0 (1,5) 2,5 See (3,0) Point 8 a (16)	
							2550			

Checking values in brackets

i.e. control rod travel than in Column 2

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\*\*

1. Auxiliary idle spring is to be adjusted at  $n = 370 \text{ min}^{-1}$  that the control-rod travel is exceeded by 0.1 - 0.2 mm.

2. Setting the idle control-lever position:

$n = 1000 \text{ min}^{-1}$ , control travel 1.9 - 2.0 mm

3. Checking the auxiliary idle spring shutoff:

Control-lever position =  $45^\circ$ . After the change-over point, the control lever does not alter its position until  $550 \text{ min}^{-1}$ .

Idle control-lever position =  $28^\circ$ . Speed range =  $350 - 450 \text{ min}^{-1}$ .

4. Checking the pneumatic shutoff aneroid box:

Lever at idle stop.

At  $n = 375 \text{ min}^{-1}$  and  $p_u = 450 \text{ mbar}$  (vacuum)  
(338 mm Hg) the control rod must return quickly to 0 mm travel position.

# Test Specifications Fuel Injection Pumps and Governors

40

VDT-WPP 001/4 MB 3,0 a  
5. Edition

En

PES 5 MW 55/320 RS 3  
RS 3RW 350/2200 MW 2  
MW 10supersedes 7.77  
company Daimler-Benz  
engine OM 617

Cam sequence and angular cam spring

1 - 2 - 4 - 5 - 3 = 0 - 72 - 144 - 216 - 288° See page 2!

Angular cam spacing tolerance  $\pm 0,5^\circ$  ( $\pm 0,75^\circ$ )

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke

1,7 - 1,8  
(1,65-1,85)

mm (from BDC)

max.

Control rod travel

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
2180	12,4	3,9 - 4,0	0,25(0,3)			
350	6,5 ( $\pm 0,1$ )	0,6 - 0,7	0,1(0,15)			
1600 1000	Sect. C, col. 4,5	---	0,25(0,3)	.		

Set uniform delivery according to the values in

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Rotational speed rev/min	Control rod travel mm	
1	2	3	4	5	6	7	8	9
30	1 2 3 4 5	min. 11 6,5 ** - max. 2	150-220 340-360 360 --- 650-700	ca. 68 ( $\pm 4$ ) 8 9 10 11	12,4 11,4 6,8 max. 1 -	2180 2280-2300 2520-2580 2800-2950 ---	12 13 14 6	100 1600 1000 Switching point 250-300(225-325)

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery Test oil temp. 40°C (104°F)		19	Full-load speed regulation	8a	Variations in fuel delivery		17	Starting fuel delivery idle	Difference	
rev/min	cm³/1000 strokes	1	rev/min	3	rev/min	cm³/1000 strokes	6	rev/min	cm³/1000 strokes	8
2180	39,0-40,0 (38,0-41,0)		2280-2300* (2275-2305)	1600	39,0-41,0 (38,0-42,0)	100	min. 57	6,0		12a
				1000	36,5-38,5 (35,5-41,0)	350	6,5-7,5 (6,0-8,0)	1,0		15
						2520-2580:	15,5-17,5 (14,5-18,5)	2,5		16
							(3,0)			

Checking values in brackets

less control rod travel than in Column 2

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D19

D19

5.82

Note:

1. Sleeve idle-speed travel = 6.75 + 0.25 mm
2. Advance-angle range, idle speed to full-load = 34 ... 42°
3. \*\* (3) At this rotational speed applying force, increase the control-rod travel by 0.4 + 0.1 mm. In doing so, the idle delivery must not be affected!
4. VDT-WPP 211/7 (3.75) supersedes adjustment instructions on MB 3.0 a (9.74)!

# Test Specifications Fuel Injection Pumps and Governors

40

VDT-WPP 001/4 MB 3,0 c

3. Edition

En

PES 5 MW 55/320 RS 4

RW 350/2200 MW 3

supersedes

7.77

company

Daimler-Benz

engine

OM 617

See page 2!

Cam sequence and angular cam spring

1 - 2 - 4 - 5 - 3 = 0 - 72 - 144 - 216 - 288 ± 0,5° (±0,75°)

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke

1,7 - 1,8  
(1,65-1,85)

mm (from BDC)

max.

Control rod travel

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
2180	12,1	3,7-3,8	0,25(0,3)			
350	6,5 (±0,1)	0,6-0,7	0,1(0,15)			
1600 1000	(Sect. C, col. 4,5) -		0,25(0,3)			

Set uniform delivery according to the values in

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	7	Rotational speed rev/min	Control rod travel mm
30	10,5-11,5 6,5 ** 3 4 5	150-220 340-360 360 --- max. 2	ca. 68 (±) 7 8 9 10 11	12,1 11,1 6,8 max. 1	2180 2280-2300 2520-2580 2800-2950		100 1600 1000 12,8-13,0 Switching point 250-300(225-325)	20,5-21,5 12,4-12,6 12,8-13,0
./.								

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery		19	Full-load speed regulation	8a	Variations in fuel delivery		17	Starting fuel delivery		Idle	Difference
Test oil temp 40°C (104°F)	rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	5	rev/min	cm³/1000 strokes	6	7	cm³/1000 strokes
	1	2		3		4			6	7	8
2180	37,5-38,5 (36,5-39,5)		2280-2300*		1600	38,0-40,0 (37,0-41,0)	100	mind. 57	6,0		12a
			(2275-2305)		1000	35,0-37,0 (34,0-38,0)	350	6,5-7,5 (6,0-8,0)	1,0		15
							1520-2580:15,5-17,5	2,5 (14,5-18,5)(3,0)			16

Checking values in brackets

less control rod travel than in Column 2

Testoil-ISO 4113

D21

BOSCH

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5.82

Notes:

1. Sliding-sleeve idle travel = 6.75 + 0.25 mm
2. Advance angle in idle - full load range = 34 - 42°
3. \*\* 3 At this engine speed, exceed control-rod travel by 0.4+0.1 mm; idle delivery must not be affected!
4. \*\*\*- "12.1 mm" - is the full-load control-rod travel set in Section A, 1-3.

D22

En

D22

⑤

# Test Specifications Fuel Injection Pumps and Governors

40

WPP 001/4 MB 2,0 g 3

2. Edition

En

PES 4 M 50 C 320 RS 103 )  
 RSF 375/2300 M 13 ) 0 400 074 988  
 See page 2!  
 Sales model 0 400 074 986

supersedes  
company  
engine

3.79  
Daimler-Benz  
OM 615

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke 1,70 - 1,80 mm (from BDC) 20 mm Control rod travel  
(1,65 - 1,85)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	12,7+0,1	3,20 - 3,30	0,25(0,30)			
375	6,9-7,1	0,65 - 0,75	0,1(0,15)			

Set uniform delivery according to the values in  

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	7	Rotational speed rev/min	Control rod travel mm
1	2	3	4	5	6		8	9
13-17 ①	11,5	250-300	50 ⑦	12,0+0,2	2200		⑫ 100	min. 20,3
② 6,9-7,1	375		⑧ 8,6-9,0		2550		⑬ 1600	12,4-12,6
③ **	395		⑨ -				⑭ 1000	12,7-12,8
④ -	-		⑩ 0-1,0		2950			
⑤ 2,5	720-820		⑪ -		-		⑯ Switching point	

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery		⑯	Full-load speed regulation	⑮	Variations in fuel delivery	⑰	Starting fuel delivery idle		Difference
Test oil temp. 40°C (104°F)	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	cm³/1000 strokes
1	2	3	4	5	6	7	8	9	8
2200	33,5-35,5 (32,5-36,5)	2550* RW=8,6-9,0	1600	32,5-34,5 (31,5-35,5)	100	min. 54,0	6,0	⑯ 12a	
			1000	32,0-33,0 (31,0-34,0)	375	6,5-7,5 (6,0-8,0)	1,0	⑮ 15	
					2550	20,5-24,5 (19,5-25,5)	2,5		
						(3,0) See point 8a ⑯	(3,0)		

Checking values in brackets

\*3,9 less control rod travel than in Column 2

Testoil-ISO 4113

D23

BOSCH

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4.80

D23

1. \*\* Position the idle-speed auxiliary spring at  $n = 395 \text{ min}^{-1}$  so that the control-rod travel is forced further by 0.1 - 0.2 mm.
2. Adjusting the idle control-lever position:  
At  $1000 \text{ min}^{-1}$ , control-rod travel 1.9 - 2.0 mm
3. Testing the idle-speed auxiliary spring shutoff  
Control-lever position  $45^\circ$ . No change in control-rod travel after switching point up to  $550 \text{ min}^{-1}$ .  
Control-lever position  $28^\circ$ . Rotational-speed range  $350 \text{ min}^{-1}$  -  $450 \text{ min}^{-1}$ .
4. Testing the pneumatic shutoff box  
Control lever against idle stop.  
At  $n = 375 \text{ min}^{-1}$  and 450 mbar (vacuum) (338 mmHg) the control rod must move briskly to RW (control-rod travel) = 0 mm.

# Test Specifications Fuel Injection Pumps and Governors

40

WPP 001/4 MB 2,0 g 1

2. Edition

En

PES 4 M 50 C 320 RS 103

RSF 375/ 2300 M 5

Komb.Nr. 0 400 074 996

1 - 3 - 4 - 2 = 0 - 90 - 180 - 270 ± 0,5(0,75°)

Sales model 0 400 074 985

See page 2!

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

supersedes 2.79  
company Daimler Benz  
engine OM 615

## A. Fuel Injection Pump Settings

Port closing at prestroke 1,70-1,80  
(1,65-1,85) mm (from BDC) 20 mm Control rod travel

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	11,9+0,1	2,90-3,00	0,25(0,3)	-	-	-
375	6,9-7,1	0,65-0,75	0,10(0,15)			

Set uniform delivery according to the values in  

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm		Rotational speed rev/min		Degree of deflection of control lever		Rotational speed rev/min	Control rod travel mm
1	2	3	4	5	6	7	8	9
13+4	11-11,5 6,9-7,1 ** 3 4 5	250-300 375 395 - 2,5	50	7 8 9 10 11	11,2-11,4 8,1-8,5 - 0 - 1,0 -	2200 2550 - 2950 -	12 13 14 6	100 1600 1000 Switching point
								min. 20,3 11,5-11,7 11,9-12,0

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery		19	Full-load speed regulation		8a	Variations in fuel delivery		17	Starting fuel delivery		18	Idle		Difference	
Test oil temp 40°C (104°F)	rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	cm³/1000 strokes	8	cm³/1000 strokes	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
2200	31,0-33,0 (30,0-34,0)	2550*	1600	29,5-31,5 (28,5-32,5)	100	min. 54,0									12a
		RW=8,1-8,5	1000	29,0-30,0 (28,0-31,0)	375	6,5-7,5 (6,0-8,0)	1,0								15
					2550	17,5-21,5 (16,5-22,5)	2,5								16
							(3,0) See point 8a								

Checking values in brackets

\*3,0 less control rod travel than in Column 2

4.80

Testoil-ISO 4113

E10

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E10

1. \*\* Position the idle-speed auxiliary spring at  $n = 395 \text{ min}^{-1}$  so that the control-rod travel is forced further by 0.1 - 0.2 mm.
2. Adjusting the idle control-lever position:  
At  $1000 \text{ min}^{-1}$ , control-rod travel 1.9 - 2.0 mm
3. Testing the idle-speed auxiliary spring shutoff  
Control-lever position  $45^\circ$ . No change in control-rod travel after switching point up to  $550 \text{ min}^{-1}$ .  
Control-lever position  $28^\circ$ . Rotational-speed range  $350 \text{ min}^{-1}$  -  $450 \text{ min}^{-1}$ .
4. Testing the pneumatic shutoff box  
Control lever against idle stop.  
At  $n = 375 \text{ min}^{-1}$  and 450 mbar (vacuum) (338 mmHg) the control rod must move briskly to RW (control-rod travel) = 0 mm.

# Test Specifications Fuel Injection Pumps and Governors

En

PES 4 M 50 C 320 RS 103

supersedes

2.79

RSF 375/2300 M 3

company

Daimler Benz

Sales model 0 400 074 986

OM 615

Kombination Nr. 0 400 074 998

1 - 3 - 4 - 2 = 0 - 90 - 180 - 270 ± 0,5(0,75°)

See page 2!

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke      1,70 - 1,80      mm (from BDC)      20 mm      Control rod travel  
 (1,65 - 1,85)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	12,7+0,1	3,20 - 3,30	0,25(0,3)			
375	6,9-7,1	0,65 - 0,75	0,10(0,15)			

Set uniform delivery according to the values in

Checking values in brackets

## B. Governor Settings

Lower rated speed Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Upper rated speed Degree of deflection of control lever			Control rod travel mm	Rotational speed rev/min	Variations in control rod travel Rotational speed rev/min			Control rod travel mm
			4	5	6			7	8	9	
13+4	1 2 3 4 5	11-11,5 6,9-7,1 ** - 2,5	250-300 375 395 - 720-820	50 7 8 9 10 11	12,0-12,2 8,6-9,0 - 0-1,0 -	2200 2550 - 2950 -		12 13 14 6	100 1600 1000 Switching point	min.20,3 12,4-12,6 12,7-12,8	

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery Test oil temp. 40°C (104°F)		19	Full-load speed regulation	8a	Variations in fuel delivery	17	Starting fuel delivery idle	18	Difference
rev/min	cm³/1000 strokes	2	3	4	5	6	7	8	cm³/1000 strokes
2200	33,5-35,5 (32,5-36,5)		2550* RW=8,6-9,0	1600	32,5-34,5 (31,5-35,5)	100	min.54,0		
				1000	32,0-33,0 (31,0-34,0)	375	6,5-7,5 (6,0-8,0)	1,0 (1,5)	

Checking values in brackets

\*ca 3,5 less control rod travel than in Column 2

4.80

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E12

E12

1. \*\* Position the idle-speed auxiliary spring at  $n = 395 \text{ min}^{-1}$  so that the control-rod travel is forced further by 0.1 - 0.2 mm.
2. Adjusting the idle control-lever position:  
At  $1000 \text{ min}^{-1}$ , control-rod travel 1.9 - 2.0 mm
3. Testing the idle-speed auxiliary spring shutoff  
Control-lever position  $45^\circ$ . No change in control-rod travel after switching point up to  $550 \text{ min}^{-1}$ .  
Control-lever position  $28^\circ$ . Rotational-speed range  $350 \text{ min}^{-1}$  -  $450 \text{ min}^{-1}$ .
4. Testing the pneumatic shutoff box  
Control lever against idle stop.  
At  $n = 375 \text{ min}^{-1}$  and 450 mbar (vacuum) (338 mmHg) the control rod must move briskly to RW (control-rod travel) = 0 mm.

# Test Specifications

## Fuel Injection Pumps 1A and Governors

40

WPP 001/4

3. Edition

En

PE 6 A 95 D 412 RS2305

EP/RSV 250-1225 A1 B562DL

supersedes  
company  
engine

7.78  
7.8W

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

### A. Fuel Injection Pump Settings

Port closing at prestroke (1,85-2,05)  
1,90-2,00 mm (from BDC)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque control valve) mm
1	2	3	4	2	3	6
1200	12,2-12,3	9,4-9,6	0,3(0,6)			
250	8,0- 8,2	0,9-1,5	0,3(0,5)			
600	- - -	C, 4-5	0,4(0,7)			

Adjust the fuel delivery from each outlet according to the values in □

Testoil-ISO 4113

### B. Governor Settings

1	Upper rated speed rev/min		Intermediate rated speed			4	Lower rated speed		3	Torque control	
Degree of deflection of control lever	Control rod travel mm		Control rod travel mm rev/min			Control-lever deflection in degrees	rev/min	Control rod travel mm	rev/min	Control rod travel mm	rev/min
1	2	3	4	5	6	7	8	9	10	11	+ 0,1
loose	800	0,3-1,0				ca. 26	250	5,5			
	X	= 5,2					100	min. 19	1225	12,2	
ca. 67	1265-1275=11,2						250	5,9-6,1	800	12,7	
2a	1290-1320= 5,0						420-480 = 2,0		600	12,7	
	1400 0,3- 1,0						600	0 - 1			

The numbers denote the sequence of the tests

### C. Settings for Fuel Injection Pump with Fitted Governor

2b	Full-load stop Test oil temp. 40°C (104°F)		6	Rotational-speed limitat Note changed to 1 rev/min		3a	Fuel delivery characteristics		Starting fuel delivery Idle	5	4a	Idle stop Control rod travel mm
rev/min	cm³/1000 strokes	3	4	5	rev/min	cm³/1000 strokes	6	7	cm³/1000 strokes	8	9	
LDA 1200	0,7 bar 92,5-89,5 (90,5-96,5)	1265-1275*	LDA 600	0,7 bar 88,0-91,0 (86,0-93,0)	100	mm RW 14,7-15,3						
			LDA 600	0 bar 67,0-70,0 (65,0-72,0)								

Checking values in brackets

\* 1 mm less control rod travel than col. 2

E14

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4.80

EAU

## D. Adjustment Test for Manifold Pressure Compensator

-2-

Ppe 2305

Test at n = 500 rev/min decreasing pressure - in bar gauge pressure  
increasing

Pump/governor	Setting Gauge pressure =	bar	Measurement Gauge pressure =	bar	Control rod travel- mm	diminution (1)
2305 / 562DL	0,68		0,22 0		12,5 - 12,6 12,3 - 12,4 11,2 - 11,4	

Notes:

(1) when n =

rev/min and  
gauge pressure =

bar (= maximum full-load control rod travel)

E15

Testoil-ISO 4113

E15 En

② **Test Specifications  
Fuel Injection Pumps ②  
and Governors**

**40**

WPP 001/4 SCA 11,0 u 2

1. Edition

En

PE 6 P 120 A 720 RS 7001

RQ 250/1000 PA 615 (1)

RQV 250 1000 PA 612 (2)

supersedes

company

engine

-

Scania

DN 11

151 kW (205PS)

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

**A. Fuel Injection Pump Settings**

from FD 141:

5,0-5,1

Port closing at prestroke

(4,95-5,15)

mm (from BDC)

to FD 052: 4,4 - 4,5 mm

(4,35- 4,55)

Rotational speed rev/min 1	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Difference cm³/ 100 strokes 4	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Spring pre-tensioning (torque-control valve) mm 6
1000	11,3±0,1	18,6 - 18,7	0,5(0,9)			3,3 ± 0,1**
	250	4,0-4,2	0,9 - 1,3	0,5(0,8)		(3,0 - 3,5)

\*\* Due to smoothing of the sealing edge, the initial spring tension with a new delivery-valve holder must be adjusted to 3,0 -0,1 mm

Adjust the fuel delivery from each outlet according to the values in

**B. Governor Settings**

..PA 615 (1)

Checking of slider PRG check Control rod travel rev/min 1		Full-load speed regulation Setting point Control rod travel rev/min 3				Idle speed regulation Setting point Control rod travel rev/min 7				Torque control Control rod travel rev/min 11	
		Control rod travel mm 4	Control rod travel mm 5	rev/min 6		Control rod travel mm 8	Control rod travel mm 9	Control rod travel mm 10			
600	15,6-16,4	600	16,0	10,3 4,0	1045-1060 1105-1135	250	4,1	100 250 300-340 = 2,0 mm	min.5,6 4,0-4,2	-	-

Torque-control travel  
on flyweight assembly dimension a =

mm

1045-1060 min⁻¹

1 mm less control  
rod travel

Speed regulation: At

Full-load delivery on  
governor control lever  
Test oil temp. 40°C (104°F)

rev/min cm³/-1000 strokes

rev/min cm³/-1000 strokes

rev/min cm³/1000 strokes/mm

**B. Governor Settings**

..PA 612 (2)

SCA 11,0 u 2

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel	
Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm
1	2	3	4	5	6	7	8	9	10	11
max.	1000 1250	15,2-17,8 0 - 1,0	-	-	-	ca.10	100 250	min.5,6 4,0-4,2	200 500 800 1000	1,0-1,2 3,6-4,0 5,6-5,8 7,7
ca.59	10,3 4,0	1040-1050 1120-1150				260-365				

Torque control travel a = mm

**C. Settings for Fuel Injection Pump with Fitted Governor**

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed	Fuel delivery characteristics high idle speed	Starting fuel delivery Idle switching point		Torque-control travel
rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm
1	2	3	4	5	6	8
1000	185,0-187,0 (182,0-190,0)	1040-1050*	600	166,0-170,0 (163,0-173,0)		

Checking values in brackets

\* 1 mm less control rod travel than col. 2

**D. Adjustment Test for Manifold Pressure Compensator**Test at n = rev/min decreasing pressure - in bar gauge pressure  
increasing

Pump/governor	Setting Gauge pressure = bar	Measurement Gauge pressure = bar	Control rod travel-difference mm
En			

② **Test Specifications  
Fuel Injection Pumps ②  
and Governors**

**40**

WPP 001/4 MB 11,4 i 4

1. Edition

En

PES 6 P 120 A 820 LS 3077

RQ 300/1100 PA 606

supercedes

company

engine

-  
Daimler Benz  
OM 407 A  
206 kW(280 PS)

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

**A. Fuel Injection Pump Settings**

Port closing at prestroke      4,0 - 4,1  
(3,95-4,15)      mm (from BDC)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm <sup>3</sup> /100 strokes	Difference cm <sup>3</sup> / 100 strokes	Control rod travel mm	Fuel delivery cm <sup>3</sup> /100 strokes	Spring pre-tensioning (torque-control valve) mm
1100	12,0+0,1	18,3 - 18,5	0,5(0,9)			
	300	5,0-5,2	1,4 - 2,2	0,8(1,2)		

Values only apply to test nozzle-and-holder assembly 1 688 901 019 and fuel-injection test tubing 1 680 750 067.

Adjust the fuel delivery from each outlet according to the values in

Testoil-ISO 4113

**B. Governor Settings**

Checking of slider PRG check Control rod travel rev/min	1	Full-load speed regulation			Idle speed regulation			Torque control			
		Setting point rev/min	Control rod travel mm	Test specifications Control rod travel mm	Setting point rev/min	Control rod travel mm	Test specifications Control rod travel mm	Control rod travel rev/min	Control rod travel mm		
650	19,2-20,8	650	20,0	11,0 4,0	1145-1160	300	4,9	100 300 360-400 =2,0	min.6,5 4,8-5,0 =2,0	1100 1000 900	12,0+0,1 12,2+0,1 12,5+0,1

Torque-control travel  
on flyweight assembly dimension a =

0,2

mm

1145-1160 min<sup>-1</sup>

1 mm less control  
rod travel

**C. Settings for Fuel Injection Pump with Fitted Governor**

Full-load delivery on governor control lever Test oil temp. 40°C (104°F)		2	Control rod stop rev/min	3a	Fuel delivery characteristics		3b	Starting fuel delivery idle speed	6
rev/min	cm <sup>3</sup> /1000 strokes		rev/min	4	cm <sup>3</sup> /1000 strokes	5	rev/min	cm <sup>3</sup> /1000 strokes/mm	Control rod travel
LDA 1100	0,7 bar 183,0-185,0 (180,0-188,0)		-	LDA 600 LDA 500	0,7 bar 185,0-191,0 (182,0-194,0) 0 bar 142,0-144,0 (139,0-147,0)		100	150,0-170,0	

Checking values in brackets

6.82

E18

**BOSCH**

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E18

## D. Adjustment Test for Manifold Pressure Compensator

-2-

Pump/governor	Setting Gauge pressure =	Measurement Gauge pressure =	Control rod travel: mm		diminution difference (1)
			bar	bar	
PES 6 P..LS 3077 / ..PA 606	0,42	0,70			12,2 - 12,3
		0			12,5 - 12,6
		0,31			10,7 - 10,8
					11,3 - 11,4

Notes:

(1) when n =

rev/min and  
gauge pressure =

bar (= maximum full-load control rod travel)

E19

E19 En

Testoil-ISO 4113

# ② Test Specifications Fuel Injection Pumps ② and Governors

40

VDT-WPP 001/4

3. Edition

En

PE 6 P 120 A 421 RS 237      RQ 300/1100 PA 193 DR  
RQV 250-1100 PA 194 DR

supersedes 1.73, 2.74  
company Saurer  
engine D 1 KT  
(290 PS)

1 - 4 - 2 - 6 - 3 - 5 je 60°

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke 2,8 + 0,1 mm (from BDC) Cyl. 6

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
1000	12	24,9 - 25,6				
600	6	5,9 - 7,1				
	12	20,8 - 22,6				
	15	30,6 - 33,0				
200	6	3,7 - 4,7				

Adjust the fuel delivery from each outlet according to the values in

## B. Governor Settings

RQ..PA 193 D

Checking of slider PRG check Control rod travel rev/min mm	Full-load speed regulation				Idle speed regulation				Torque control	
	Setting point rev/min	Control rod travel mm	Test specifications rev/min	Control rod travel mm	Setting point rev/min	Control rod travel mm	Test specifications rev/min	Control rod travel mm	rev/min	Control rod travel mm
650   15,7-16,3	650   16,0	1120   1160   1200   1270	14,6-15,0   8,0-13,6   0- 1,8   0	610   0   100   250   350   510	0   100   7,1-8,1   5,3-7,4   3,2-5,4   0	100   250   350   510	7,1-8,1   5,3-7,4   3,2-5,4   0	750   1050	15,8-16,0   14,8-15,1	

Torque-control travel on flyweight assembly dimension a =

0,35 mm

1 mm less control rod travel

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery on governor control lever Test oil temp. 40°C (104°F)		Control rod stop rev/min	Fuel delivery characteristics		Starting fuel delivery idle speed rev/min	Control rod travel cm³/1000 strokes/mm
rev/min	cm³/-1000 strokes	rev/min	rev/min	cm³/-1000 strokes	rev/min	cm³/1000 strokes/mm
LDA	0,7 bar		LDA	0,7 bar	100	220,0-240,0
1100	213,0-215,0		700	185,0-189,0		

0 bar -- 2,1 + 0,1 mm RW less

Checking values in brackets

10.75

Testoil-ISO 4113

E20

**BOSCH**

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E20

**B. Governor Settings**

RQV .. 194 D

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel	
Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm
1	2	3	4	5	6	7	8	9	10	11
ca.60	1100	15,0-18,0	-	-	-	ca.12	180	6,4-8,0	1100	8,2
	1150	11,0-15,0					250	3,7-6,1		
	1200	6,6-11,8					350	1,9-3,3	-	-
	1280	0 - 6,2					490	0		
	1360	0				(3a)				

Torque control travel a = 0 mm

**C. Settings for Fuel Injection Pump with Fitted Governor**

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F) (2)		Rotational-speed limitation intermediate speed (2b) rev/min (4a)		Fuel delivery characteristics high idle speed (5a) rev/min (5b)		Starting fuel delivery Idle switching point (6)		Torque-control travel Control rod travel rev/min (5) mm (9)	
rev/min	cm³/1000 strokes	rev/min		rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	mm
1	2	3	4	5	6	7	8	9	
LDA	0,7 bar	0,7 bar	LDA	0 bar	100	216,0-236,0			
1100	211,0-213,0	1130	1100	167,0-171,0		Change-over point 130-200 min⁻¹			

Checking values in brackets

\* 1 mm less control rod travel than co: 2

Testoil-ISO 4113

**D. Adjustment Test for Manifold Pressure Compensator**

Test at n = 500 rev/min	decreasing pressure - in bar gauge pressure (1)		Measurement	Control rod travel diminution difference
Pump/governor	Setting	Gauge pressure = bar	Gauge pressure = bar	mm
237 / 193 D	0,46 - 0,50		0,10-0,18	- 0,1 mm (1) - 2,3 mm (2)
237 / 194 D	0,09 - 0,11		0,24-0,30	ca. 1,4 (2)

En

1000

0,7

# Test Specifications Fuel Injection Pumps and Governors

40

WPP 001/4 MB 3,0 n

2. Edition

En

PES 5 MW 55/320 RS 16  
 RW 375/2200 MW 29  
 0 403 245 015  
 0 403 245 017 - Sales model  
 See page 2!

supersedes 12.80  
 company Daimler Benz  
 engine OM 617 A

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke 2,10-2,20 mm (from BDC)  
 (2,05-2,25) 21 mm Control rod travel

### without altitude-pressure compensator

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	13,6+0,1	5,35-5,45	0,25(0,3)			
375	4,8-4,9	0,6-0,7	0,10(0,15)			
1600			0,25(0,3)			
2180			0,25(0,3)			

Set uniform delivery according to the values in

Checking values in brackets

## B. Governor Settings

### without altitude-pressure compensator

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel	Rotational speed rev/min	Rotational speed rev/min	Control rod travel mm	
1	2	3	4	5	6	7	8	9
27-31	min. 11 max. 11 ** 4 5	100 320 375 - -	69 7 8 9 10 11	11,9-12,1 11,0 4,0 0,0-1,0	2180 2300-2320 2620-2720 2950	12 13 14 6	100 1600 1000 270-320 (250-340)	20,5-21,5 12,9-13,1 13,6-13,7 Switching point (250-340)

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery Test oil temp 40°C (104°F)		19	Full-load speed regulation	8a	Variations in fuel delivery	17	Starting fuel delivery Idle	Difference	
rev/min	cm³/1000 strokes	3	rev/min	4	cm³/1000 strokes	5	rev/min	cm³/1000 strokes	8
2180	50,0-52,0 (49,0-53,0)	2300-2320* (2290-2330)	1600	52,0-53,5 (51,0-54,5)	100min.	55,0	6,0	12a	
			1000	53,5-54,5 (52,5-55,5)	375	6,0-7,0 (5,5-9,5)	1,0	15	
					2550	24,0-27,0 (23,0-28,0)	2,5		
						(3,0)	(3,0)	16	

Checking values in brackets

less control rod travel than in Column 2

5.82

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Testoil-ISO 4113

E22

E 22

Testing with ALDA

Point	$\text{min}^{-1}$	$\text{cm}^3/1000 \text{ H}$	RW	Pressure (absolute)
18	1000	53,5 - 54,5 (52,5 - 55,5)	13,6 - 13,7	1733 mbar (1300 mmHg)
18a	*** 1000	42,5 - 44,5 (41,5 - 45,5)	-	1067 mbar (800 mmHg)
19	2180	50,0 - 52,0 (49,0 - 53,0)	11,9 - 12,1	1733 mbar (1300 mmHg)
12a	100	min. 55	20,5 - 21,5	1733 mbar (1300 mmHg)
15	375	6,0 - 7,0 (5,5 - 9,5)	4,8 - 4,9	973 mbar (740 mmHg)

1. Adjusting the idle

Text supersedes Section 4.1 of test instructions VDT-W-420/300  
Suppl. 2, Ed. 2.

Set the control lever to an angle of  $69^\circ$ . Operate the fuel-injection pump at  $1000 \text{ min}^{-1}$ .

Screw in the spring retainer until a control-rod travel of 13,6 - 13,7 mm is reached.

Set the control lever to an angle of  $49^\circ$ . Operate the fuel-injection pump at  $1000 \text{ min}^{-1}$ . Control-rod travel 8,6 - 9,3 must be reached.

2. Adjusting the lower rated speed

Text supersedes Section 4.3 of test instructions VDT-W 420/300  
Suppl. 2, Ed. 2.

Operate the fuel-injection pump at  $n = 800 \text{ min}^{-1}$ . Take back the control lever until a control-rod travel of 1,0 - 1,3 mm is reached.

Testoil-ISO 4113

The resulting deflection of the control lever must be within the allowable tolerance. Fix the control lever in this position. Drive the fuel-injection pump at a speed according to Point 2 Section B of the test specification sheet. Set regulation at adjusting screw (28).

3. Adjusting the idle-speed auxiliary spring (70)

\*\* Position the idle-speed auxiliary spring in contact as the characteristic curve levels off at  $n=520-550 \text{ min}^{-1}$ .

4. Adjusting the sensing lever

Place the control lever against the full-load stop.

Operate the fuel-injection pump at  $n = 375 \text{ min}^{-1}$ . Adjust the sensing lever so that the control-rod travel is 0.1 (0.1 - 0.2) mm above the full-load control-rod travel at  $n = 1000 \text{ min}^{-1}$ .

5. \*\*\* Correct the quantity of fuel injected at the correction screw of the ALDA aneroid box. Max. correction  $\pm 0.75 \text{ mm}$  control-rod travel.

6. Pin projection =  $16.65 \pm 0.1 \text{ mm}$

7. Shutoff check: Operate the fuel-injection pump at  $n = 200 \text{ min}^{-1}$ .

Force the control rod through the spring-loaded idle stop. The resulting control-rod travel must be max. 5 mm.

8. Test the pneumatic shutoff: Control lever in idle position. Operate the fuel-injection pump at  $n = 375 \text{ min}^{-1}$ . At 450 mbar (338 mmHg) (vacuum) the control rod must move briskly to control-rod travel 0 mm.

9. Control-lever range idle - full load =  $38 - 42^\circ$ .

Testoil-ISO 4113

②

# Test Specifications Fuel Injection Pumps ② and Governors

40

WPP 001/4 SCA 11,0 n 2

1. Edition

En

PE 6 P 110 A 720 RS3005 RQ 250/1100 PA 410R

supersedes

company

engine

Scania

DS 11

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke

3,30-3,40  
(3,25-3,45)

mm (from BDC)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
1100	12,3	13,5 - 13,7	0,4(0,8)			2,5-0,1** (max.2,2-2,9)
	+ 0,1					
225	5,8-6,0	0,6 - 2,0	0,2(0,4)			
600	- - - -	C, 4 - 5	0,6(1,0)			

Adjust the fuel delivery from each outlet according to the values in

Testoil-ISO 4113

## B. Governor Settings

Checking of slider PRG check Control rod travel mm	Setting point rev/min	Full-load speed regulation			Idle speed regulation			Torque control Control rod travel mm
		Setting point Control rod travel mm	Test specifications Control rod travel mm	Test specifications rev/min	Setting point Control rod travel mm	Test specifications Control rod travel mm	Test specifications rev/min	
1	3	4	5	6	7	8	9	11
700	15,6-16,4	700	16,0	11,3	1145-1160	225	5,9	100
				4,0	1230-1260			min.7,5
1100	15,6-16,0					225	5,8-6,0	-
1400	0 - 1						330-390= 2,0	-

Torque-control travel  
on flyweight assembly dimension a =

mm

Speed regulation At

1 mm less control  
rod travel

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery on governor control lever Test oil temp. 40°C (104°F)	rev/min	cm³/1000 strokes	Control rod stop		Fuel delivery characteristics		Starting fuel delivery idle speed	Control rod travel mm
			rev/min	3	rev/min	cm³/1000 strokes		
1100	135,0-137,0 (132,0-140,0)		***		600	132,5-135,5 (129,5-138,5)	100 225 245	190-240 8 - 12** 6,1 mm RW dispersion max.4(7)

Checking values in brackets

7.79

F1  
BOSCH

**Adjustment instructions:**

\*\* In the case of greater scatter, change the initial tension of the delivery-valve spring accordingly.

More pretension gives more fuel delivery when idling.

\*\*\* Adjust the full-load delivery at the excess fuel stop.  
Preset the control lever by 3° more i.e. 1.5 mm more  
control-rod travel, in order that starting control-rod  
travel is reached.

**Start-of-delivery test without -- Start-of-delivery test with**  
**Robo diaphragm**

**Testoil-ISO 4113**

F2

En

F2

# Test Specifications Fuel Injection Pumps and Governors

PES 5 MW 55/320 RS 16  
 RW 375/2000 MW 28-2  
 0 403 245 018  
 1 - 2 - 4 - 5 - 3  
 0 -72 -144-216-288 ± 0,50(0,75)

supersedes -  
 company Daimler-Benz  
 engine OM 617 A - USA  
 83,0 kW(113PS)

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke 2,10 - 2,20 mm (from BDC) 21 mm Control rod travel  
 (2,05 - 2,25)

### without altitude-pressure compensator

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	13,6+0,1	5,35-5,45	0,25(0,3)			
375	4,8-4,9	0,6 - 0,7	0,10(0,15)			
1600			0,25(0,3)			
1900			0,25(0,3)			

Set uniform delivery according to the values in  

Checking values in brackets

## B. Governor Settings

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Rotational speed rev/min	Control rod travel mm	
1	2	3	4	5	6	7	8	9
27-31	min.11 max.11 4,8-4,9 **	100 320 375	69	7 8 9 10 11	11,9-12,1 11,0 4,0 0,0-1,0	1900 1980-2000 2170-2270 2330	100 1600 1000 Switching point 270-320(250-340)	20,5-21,5 12,9-13,1 13,6-13,7
5	-							

## C. Settings for Fuel Injection Pump with Governor Mounted

Full-load delivery		19	Full-load speed regulation	8a	Variations in fuel delivery	17	Starting fuel delivery idle	18	Difference
Test oil temp 40°C (104°F)	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	cm³/1000 strokes
	1	2		3	4	5	6	7	8
	1900	51,0-53,0 (50,0-54,0)	1980-2000*	1970-2010	1600	52,0-53,5 (51,0-54,5)	100	min.54,0	6,0
					1000	53,5-54,5 (52,5-55,5)	375	6,0-7,0 (5,5-9,5)	1,0
						2180	21,0-24,0 (20,0-25,0)	(1,5)	2,3
								(3,0)	(3,0)

Checking values in brackets

less control rod travel than in Column 2

8.81

Testing with ALDA

Point	$\text{min}^{-1}$	$\text{cm}^3/1000 \text{ H}$	RW	Pressure (absolute)
18	1000	53,5 - 54,5 (52,5 - 55,5)	13,6 - 13,7	1733 mbar(1300 mmHg)
18a	*** 1000	42,5 - 44,5 (41,5 - 45,5)	-	1067 mbar( 800 mmHg)
19	1900	51,0 - 53,0 (50,0 - 54,0)	11,9 - 12,1	1733 mbar (1300 mmHg)
12a	100	min. 54	20,5 - 21,5	1733 mbar (1300 mmHg)
15	375	6,0 - 7,0 (5,5 - 9,5)	4,8 - 4,9	896 mbar (740 mmHg)

1. Adjusting the idle

Test supersedes Section 4.1 of test instructions VDT-W-420/300  
Suppl. 2, Ed. 2.

Set the control lever to an angle of  $69^\circ$ . Operate the fuel-injection pump at  $1000 \text{ min}^{-1}$ .

Screw in the spring retainer until a control-rod travel of 13,6 - 13,7 mm is reached.

Set the control lever to an angle of  $49^\circ$ . Operate the fuel-injection pump at  $1000 \text{ min}^{-1}$ . Control-rod travel 8,6 - 9,3 must be reached.

2. Adjusting the lower rated speed

Text supersedes Section 4.3 of test instructions VDT-W 420/300  
Suppl. 2, Ed. 2.

Operate the fuel-injection pump at  $n = 800 \text{ min}^{-1}$ . Take back the control lever until a control-rod travel of 1,0 - 1,3 mm is reached.

Testoil-ISO 4113

The resulting deflection of the control lever must be within the allowable tolerance. Fix the control lever in this position. Drive the fuel-injection pump at a speed according to Point 2 Section B of the test specification sheet. Set regulation at adjusting screw (28).

3. Adjusting the idle-speed auxiliary spring (70)

- \*\* Position the idle-speed auxiliary spring in contact as the characteristic curve levels off at  $n=520-550 \text{ min}^{-1}$ .

4. Adjusting the sensing lever

Place the control lever against the full-load stop. Operate the fuel-injection pump at  $n = 375 \text{ min}^{-1}$ . Adjust the sensing lever so that the control-rod travel is 0.1 (0.1 - 0.2) mm above the full-load control-rod travel at  $n = 1000 \text{ min}^{-1}$ .

5. \*\*\* Correct the quantity of fuel injected at the correction screw of the ALDA aneroid box. Max. correction  $\pm 0.75 \text{ mm}$  control-rod travel.

6. Pin projection =  $16.65 \pm 0.1 \text{ mm}$

7. Shutoff check: Operate the fuel-injection pump at  $n = 200 \text{ min}^{-1}$ . Force the control rod through the spring-loaded idle stop. The resulting control-rod travel must be max. 5 mm.

8. Test the pneumatic shutoff: Control lever in idle position. Operate the fuel-injection pump at  $n = 375 \text{ min}^{-1}$ . At 450 mbar (338 mmHg) (vacuum) the control rod must move briskly to control-rod travel 0 mm.

9. Control-lever range idle - full load =  $38 - 42^\circ$ .

# **Test Specifications Fuel Injection Pumps and Governors**

40

WPP 001/4 MB 3,0 k 1

2. Edition

En

PES 5 MW 55/320 RS 20  
RW 375/2200 MW 27-1  
Komb.-Nr. 0 403 245 015

See page 2!

supercedes  
company  
engine

8.80  
Daimler Benz  
OM 617 USA

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers.

#### **A. Fuel Injection Pump Settings**

**Port closing at prestroke** **2,10-2,20** mm (from BDC) **21 mm** Control rod travel  
**(2,05-2,25)**

without altitude-pressure compensator

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm <sup>3</sup> /100 strokes 1	Difference cm <sup>3</sup> /100 strokes 2	Control rod travel mm	Fuel delivery cm <sup>3</sup> /100 strokes 3	Spring pre tensioning (compensating valve) mm
1000	14,3+0,1	3,95 - 4,05	0,25(0,3)			
375	7,0-7,2	0,60 - 0,70	0,10(0,15)			
1600			0,25(0,3)			
2180			0,25(0,3)			

Set uniform delivery according to the values in

### Checking values in brackets

## **B. Governor Settings**

without altitude-pressure compensator

Lower rated speed			Upper rated speed				Variations in control rod travel		
Degree of deflection of control lever	Control rod travel	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel	Rotational speed rev/min		Rotational speed rev/min	Control rod travel mm	
1	2	3	4	5	6	7	8	9	
29-2	1 min.11,1 2 7,0-7,2 3 ** 4 - 5 2,0	250 375 385 - 650-700	69	7 13,4-13,6 8 12,5 9 4,0 10 0,0-1,0 11	2180 2280-2300 2670-2730 2950		12 20,5-21,5 13 14,0-14,2 14 14,3-14,4 6 Switching point 250-300(230-320)	100 1600 1000	

without altitude-pressure compensator

### **C. Settings for Fuel Injection Pump with Governor Mounted**

Full-load delivery		(19)	Full-load speed regulation	(8a)	Variations in fuel delivery	(17)	Starting fuel delivery idle	
Test oil temp. 40°C (104°F)						(18)		Difference
rev/min	cm³/1000 strokes		rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	cm³/1000 strokes
1	2		3	4	5	6	7	8
2180	40,0-42,0 (39,0-43,0)		2280-2300* (2275-2305)	1600	39,5-41,5 (38,5-42,5)	100	min. 52,0	6,0
				1000	39,5-40,5 (38,5-41,5)	375	6,0-7,0 (5,5-7,5)	1,0 (1,5)
						2550	14,5-20,5 (13,5-21,5)	2,5 (3,0)

### Checking values in brackets

less control rod travel than in Column 2

1. Test sequence - Change in VDT-W-420/300  
Suppl. 2, Ed. 2

Section 4.1 - Adjust the spring retainer (compensation capsule)

New text:

Run the injection pump at  $n = 1,000 \text{ min}^{-1}$ .

Fix the control lever at  $69^\circ$ .

Using a pin wrench, turn in the spring retainer so far that the control-rod travel is reached at  $n = 1,000 \text{ min}^{-1}$ . Pin wrench = KDEP 1064/1.

Measure the full-load delivery.

Fix the control lever at  $49^\circ$ .

Drive the injection pump at  $n = 1,000 \text{ min}^{-1}$ .

The control-rod travel must be 9.1 - 9.8 mm.

Section 4.3 changes as follows:

Drive the injection pump at  $n = 800 \text{ min}^{-1}$ .

Set the control lever so that the control-rod travel reaches 1.4 - 1.7 mm.

The control lever must lie within the permissible tolerance.

Move the idle stop up against the control lever and lock it there.

Reduce the pump speed to  $n = 375 \text{ min}^{-1}$  and release the leaf spring (32) with the lower adjusting screw (28) until the control-rod travel specified in the Test-Specifications Sheet is reached.

Carry on according to the Testing Instructions, taking into account that Section 4.8 no longer applies.

2. Testing of Sections A, B and C is carried out without altitude pressure compensator (ADA) aneroid box.  
After this test has been completed, the aneroid box is refitted.

Testing the governor with the ADA aneroid box.

Pump speed	Pressure (abs. in mbar)	Reduction from the maximum full-load control-rod travel (mm)
1,000	840	1.0 - 1.2 (0.95 - 1.25)
1,000	907	0.3 - 0.6 (0.25 - 0.65)
1,000	667	2.4 - 2.9 (2.35 - 2.95)

3. Pin projection dimension =  $16.65 \pm 0.05 \text{ mm}$   
4. \*\* At this pump speed, apply pressure to the control lever and increase the control-rod travel by  $0.4^{+0.1} \text{ mm}$ .  
The idle delivery may not change.

Testoil-ISO 4113

F10

5. Setting angle - Idle/full-load 38 - 42°
6. Sensing-lever setting: Bring sensing lever into contact at  $n = 375 \text{ min}^{-1}$  (control lever in full-load position). Control-rod travel must be 0.1 (0.1 - 0.2) mm more than the full-load control-rod travel at  $n = 1,000 \text{ min}^{-1}$ .
7. Pneumatic shut-off check:  
Move the control lever to the idle position.  
Drive the injection pump at  $n = 375 \text{ min}^{-1}$ .  
At  $P_u = 450 \text{ mbar}$  (338 mm Hg) (vacuum), the control rod must move rapidly to control-rod travel = 0 mm position.
8. Mechanical shut-off check:  
Overcome the idle stop at the control lever.  
Drive the injection pump at  $n = 200 \text{ min}^{-1}$ .  
The control-rod travel must remain below 5 mm.

**Testoil-ISO 4113**

**F11**

*F11*

En.

⑤

# Test Specifications Fuel Injection Pumps and Governors

40

WPP 001/4 MB 2,4 i 1

4. Edition

En

PES 4 MW 55/320 RS 21  
 RW 375/2200 MW 27-1  
 Komb. nr. 0 403 244 008

supersedes  
company  
engine

10.81  
Daimler-Benz  
OM 616 USA

See page 2!

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke      2,10 - 2,20      mm (from BDC)      21 mm      Control rod travel  
 (2,05 - 2,25)

\*\*

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (compensating valve) mm
1	2	3	4	2	3	6
1000	14,3+0,1	3,95 - 4,05	0,25(0,3)			
375	7,1-7,3	0,65 - 0,75	0,1(0,15)			
1600			-0,25(0,3)			
2180			0,25(0,3)			

Set uniform delivery according to the values in

Checking values in brackets

## B. Governor Settings

\*\* without altitude-pressure compensator

Lower rated speed			Upper rated speed			Variations in control rod travel		
Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Degree of deflection of control lever	Control rod travel mm	Rotational speed rev/min	Rotational speed rev/min	Control rod travel mm	
1	2	3	4	5	6	7	8	9
29±2	1 2 3 4 5	min.11,1 7,1-7,3 ** - 2,0	100 375 385 - 650-700	69 7 8 9 10 11	13,4-13,6 12,5 4,0 0,0-1,0 -	2180 2280-2300 2670-2730 2950 -	12 13 14 6	20,5-21,5 14,0-14,2 14,3-14,4 Switching point 230-300(230-320)

## C. Settings for Fuel Injection Pump with Governor Mounted

\*\*

Full-load delivery		19	Full-load speed regulation	8a	Variations in fuel delivery	17	Starting fuel delivery idle	18	Difference
Test oil temp 40°C (104 F)	rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes
1	2	3	4	5	6	7	8	9	10
2180	40,0-42,0 (39,0-43,0)	2280-2300* (2275-2305)	1600	39,5-41,5 (38,5-42,5)	100	min.52,0	6,0	12a	
			1000	39,5-40,5 (38,5-41,5)	375	6,5-7,5 (6,0-9,0)	1,0	15	
						14,5-20,5 (13,5-21,5)	2,5		
						(3,0)	2,5	16	

Checking values in brackets

less control rod travel than in Column 2

2.82

**BOSCH**

Geschäftsbericht KH Kundendienst Kfz-Ausrüstung  
 1980 by Robert Bosch GmbH, Postfach 50, D-7000 Stuttgart 1 Printed in the Federal Republic of Germany  
 Imprime en République Fédérale d'Allemagne par Robert Bosch GmbH

IA2

F12

## 4. Edition

**1. Test sequence - Change in VDT-W-420/300  
Suppl. 2, Ed. 2**

**Section 4.1 - Adjust the spring retainer (compensation capsule)**

**New text:**

Run the injection pump at  $n = 1,000 \text{ min}^{-1}$ .

Fix the control lever at  $69^\circ$ .

Using a pin wrench, turn in the spring retainer so far that the control-rod travel is reached at  $n = 1,000 \text{ min}^{-1}$ . Pin wrench = KDEP 1064/1.

Measure the full-load delivery.

Fix the control lever at  $49^\circ$ .

Drive the injection pump at  $n = 1,000 \text{ min}^{-1}$ .

The control-rod travel must be 9.1 - 9.8 mm.

**Section 4.3 changes as follows:**

Drive the injection pump at  $n = 800 \text{ min}^{-1}$ .

Set the control lever so that the control-rod travel reaches 1.4 - 1.7 mm.

The control lever must lie within the permissible tolerance.

Move the idle stop up against the control lever and lock it there.

Reduce the pump speed to  $n = 375 \text{ min}^{-1}$  and release the leaf spring (32) with the lower adjusting screw (28) until the control-rod travel specified in the Test-Specifications Sheet is reached.

Carry on according to the Testing Instructions, taking into account that Section 4.8 no longer applies.

**2. Testing of Sections A, B and C is carried out without altitude pressure compensator (ADA) aneroid box.**

After this test has been completed, the aneroid box is refitted.

**Testing the governor with the ADA aneroid box.**

Pump speed	Pressure (abs. in mbar)	Reduction from the maximum full-load control-rod travel (mm)
1,000	840	1.0 - 1.2 (0.95 - 1.25)
1,000	907	0.3 - 0.6 (0.25 - 0.65)
1,000	667	2.4 - 2.9 (2.35 - 2.95)

**3. Pin projection dimension =  $16.65 \pm 0.05 \text{ mm}$**

**4. \*\* At this pump speed, apply pressure to the control lever and increase the control-rod travel by  $0.4^{+0.1} \text{ mm}$ .  
The idle delivery may not change.**

**Testoil-ISO 4113**

4. Edition

5. Setting angle - Idle/full-load 38 - 42°
6. Sensing-lever setting: Bring sensing lever into contact at  $n = 375 \text{ min}^{-1}$  (control lever in full-load position). Control-rod travel must be 0.1 (0.1 - 0.2) mm more than the full-load control-rod travel at  $n = 1,000 \text{ min}^{-1}$ .
7. Pneumatic shut-off check:  
Move the control lever to the idle position.  
Drive the injection pump at  $n = 375 \text{ min}^{-1}$ .  
At  $P_u = 450 \text{ mbar}$  (338 mm Hg) (vacuum), the control rod must move rapidly to control-rod travel = 0 mm position.
8. Mechanical shut-off check:  
Overcome the idle stop at the control lever.  
Drive the injection pump at  $n = 200 \text{ min}^{-1}$ .  
The control-rod travel must remain below 5 mm.

**Testoil-ISO 4113**

①

# Test Specifications Fuel Injection Pumps ① and Governors

40

En

VDT-WPP 001/4  
6. Edition

PE 6 P 120 A 320 RS 278    RQV 250-1100 PA 243 R  
 PE 6 P 120 A 320 RS 298    RQV 250-1100 PA 277 R

supersedes 7.74  
 company: A E C  
 engine: T.L. 12

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke    3,4+0,1    mm (from BDC) ( + 0,15 ) ( - 0,05 )

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
1000	12	19,7 - 20,3	0,5			
600	9	8,4 - 9,6				
	15	18,6 - 20,4				
200	9	3,3 - 4,3				

Adjust the fuel delivery from each outlet according to the values in

## B. Governor Settings

RQV..243 R

Upper rated speed Degree of deflection of control lever	rev/min Control rod travel mm	Control rod travel mm	Intermediate rated speed			Lower rated speed Degree of deflection of control lever	rev/min Control rod travel mm	Control rod travel mm	Sliding sleeve travel	
			1a	2a	4				3	10
ca.61	1110	15,0-18,3	-	-	-	ca.25	80	7,0-11,0	350	3,2-3,6
	1150	8,2-13,6					150	5,1- 8,6	750	4,9-5,3
	1200	0 - 7,2					250	1,1- 4,8	1110	8,3
	1260	0					330	0	-	-

Torque control travel a =  mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed	Fuel delivery characteristics		Starting fuel delivery idle switching point	6	Torque-control travel
rev/min	cm³/1000 strokes	rev/min	4a	5a high idle speed 5b rev/min	rev/min	cm³/1000 strokes	rev/min
1	2	3	4	5	6	7	8
1100	229,0-231,0 (227,0-233,0)	1120			100	23,5-25,5	
					250	1,5- 2,1	

Checking values in brackets

\* 1 mm less control rod travel than col. 2

Testoil-ISO 4113

F15

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Geschäftsbericht KH Kundendienst Kfz-Ausrüstung.  
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6.75

## B. Governor Settings

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel			
Degree of deflection of control lever	rev/min Control rod travel mm	Control rod travel rev/min	1a	Degree of deflection of control lever	rev/min	Control rod travel	4	Degree of deflection of control lever	rev/min	Control rod travel	3	Sliding sleeve travel
1	2	3	2a	4	5	6	4	7	8	9	10	11
ca.61	1100	15,0-18,3	-	-	-	-	ca.25	80	7,0-11,0	350	3,2-3,4	
	1150	8,2-13,6						150	5,1- 8,6	750	4,9-5,1	
	1200	0 - 7,2						250	1,1- 4,8	1110	8,5	
	1260	0						330	0			

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)			Rotational-speed limitation intermediate speed	Fuel delivery characteristics high idle speed	Starting fuel delivery Idle switching point	Torque-control travel		
rev/min	cm³/1000 strokes	rev/min	4a	5a 5b	6	5		
1	2	3	4	5	6	7	8	9
0,7	bar			0	bar			
1100	235,0-239,0 (233,0-241,0)		1130	1100	210,0-215,0 (208,0-217,0)	-	-	
					250	13,0-23,0		

Checking values in brackets

\* 1 mm less control rod travel than co. 2

Testoil-ISO 4113

## D. Adjustment Test for Manifold Pressure Compensator

Test at n = rev/min decreasing pressure - in bar gauge pressure  
increasing pressure - in bar gauge pressure

Pump/governor	Setting	Measurement		Control rod travel-dimension difference
	Gauge pressure = bar	Gauge pressure = bar	mm	

En

Manifold-pressure compensator setting -  $n = 500$  r/min pressure drop in bar;

Setting  $0.45-0.48 = 0.1$  mm control-rod travel decrease

Measurement  $0.036-0.41 = 1.1$  mm control-rod travel decrease

Test sequence:

1. RQV governor according to WPP 001/4, 6th supplement!
2. Setting manifold-pressure compensator (only for pump 298 with PA 277 R):  
Basic setting of pump and governor without manifold-pressure compensator  
Mount manifold-pressure compensator: At  $n = 1100$  and 0 bar, set full-load delivery on stop screw of bell crank.  
By means of pressure on diaphragm - connect compressed air - adjust stop so that more control-rod travel is achieved than is required for full-load delivery at max. charge-air pressure. Then, at  $n = 1100$  r/min and max. charge-air pressure, set full-load delivery on stop screw in housing.
3. Manifold-pressure compensator setting, see above - correct by altering initial compression of spring, i.e. twist guide bushing of helical spring!

Testoil-ISO 4113

# Test Specifications

## Fuel Injection Pumps 1A and Governors

40

VDT-WPP 001/4

6. Edition

En

PES 6 P 100 A 720 RS 1010 EP/RSV 300-1050 P2/366 D

supersedes  
company  
engine

12.74(4)  
John Deere  
6531 A

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

### A. Fuel Injection Pump Settings

Port closing at prestroke 2,4 + 0,1 mm (from BDC)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
1000	12	12,7-13,4	0,5			
600	9	5,6- 6,8				
	12	11,6-13,2				
	15	17,2-19,0				
200	9	4,0- 5,2				

Adjust the fuel delivery from each outlet according to the values in [ ]

### B. Governor Settings

EP/RSV..366 D

① Upper rated speed rev/min Degree of deflection of control lever 1	Control rod travel mm	Control rod travel mm rev/min	Intermediate rated speed 4      5      6	④ Control-lever deflection in degrees 7	Lower rated speed rev/min	Control rod travel mm	③ Torque control rev/min	Control rod travel mm
ca.43	1050 1100 1150	16,0 12,1 7,4	without auxiliary spring	ca.19	300 150 300 450 680	6,0 19-21 5,7-6,3 2,9-4,4 0-1	1030	0
2a	1160 1200 1340	10,0-12,0 3,1- 5,1 0,3- 1,0	with auxiliary spring				400	0,6-0,8

The numbers denote the sequence of the tests

### C. Settings for Fuel Injection Pump with Fitted Governor

②b Full-load stop Test oil temp. 40°C (104°F) rev/min	⑥ Rotational-speed limitat Note: changed to 1 rev/min 3	③a Fuel delivery characteristics rev/min	Starting fuel delivery Idle rev/min	⑤	④a Idle stop Control rod travel mm
1,0 1050	bar 147,0-151,0	0,25 550 XX 0 1050	bar 93,0-101,0 bar 87,0-91,0	100	160,0-180,0

Checking values in brackets

\* 1 mm less control rod travel than col. 2

F21

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Geschäftsbericht KH Kundendienst Kfz-Ausrüstung  
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Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

8.75

F21

The numbers denote the sequence of the tests

EP/RSV..367DR

**B. Governor Settings**

1 Degree of deflection of control lever	Upper rated speed rev/min		Intermediate rated speed			4 Control-lever deflection in degrees	Lower rated speed		3 Torque control		
	Control rod travel mm	Control rod travel mm rev/min	4	5	6		rev/min	Control rod travel mm	rev/min	Control rod travel mm	
ca.38	1040	16,0	without auxiliary spring	ca.17	400	7,2	1050	0	0	0	
	1080	11,5			200	19 - 21					
	1220	4,6			400	6,9-7,5					
	1050	ca.11,0			550	3,2-5,1					
	1155	ca. 4,7			780	0 - 1					
	1280	0,3-1,0	with auxiliary spring		500	0,8-1,0					

**C. Settings for Fuel Injection Pump with Fitted Governor**

2b Full-load stop Test oil temp. 40°C (104°F)	6 Rotational-speed limitat.		3a Fuel delivery characteristics		Starting fuel delivery Idle		5 rev/min	4a Idle stop Control rod travel mm
	rev/min	cm³/1000 strokes	Note: changed to ...	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	
LDA	0,9 bar			LDA	0 bar			
1050	142,0-144,0		1085-1095*	550	108,0-116,0	100	160-180	
750	156,0-160,0			1155	24,0- 44,0	400	21,0-27,0	

Checking values in brackets

\* 1 mm less control rod travel than col. 2

Testoil-ISO 4113

**B. Governor Settings**

1 Degree of deflection of control lever	Upper rated speed rev/min		Intermediate rated speed			4 Control-lever deflection in degrees	Lower rated speed		3 Torque control		
	Control rod travel mm	Control rod travel mm rev/min	4	5	6		rev/min	Control rod travel mm	rev/min	Control rod travel mm	
ca.38	1040	16,0	without auxiliary spring	ca.17	400	7,2	1050	0	0	0	
	1080	11,2			200	19 - 21					
	1120	5,2			400	6,9-7,5					
	1050	ca.10,6			550	3,2-5,1					
	1100	ca. 4,7			780	0 - 1					
	1280	0,3-1,0	with auxiliary spring		500	0,8-1,0					

**C. Settings for Fuel Injection Pump with Fitted Governor**

2b Full-load stop Test oil temp. 40°C (104°F)	6 Rotational-speed limitat.		3a Fuel delivery characteristics		Starting fuel delivery Idle		5 rev/min	4a Idle stop Control rod travel mm
	rev/min	cm³/1000 strokes	Note: changed to ...	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	
LDA	1,0 bar			LDA	0 bar			
1050	151,0-153,0		1085-1095*	550	108,0-116,0	100	160-180	
750	161,0-167,0			1150	24,0- 44,0	400	21,0-27,0	

Checking values in brackets

\* 1 mm less control rod travel than col. 2

F22

En

## D. Adjustment Test for Manifold Pressure Compensator

Ppe 1010

-3-

Test at  $n = 500$  rev/min decreasing pressure - in bar gauge pressure

Pump/governor	Setting Gauge pressure =	bar	Measurement Gauge pressure =	bar	Control rod travel- mm	diminution (1) difference
1010 / 366DR:	0,85		0,17			3,8 mm
1010 / 367DR:	0,55		0,20			-0,2 mm -1,9 mm
1010 / 370DR:	0,62		0,20			-0,2 mm -2,3 mm

Notes

(1) when  $n = 500$  rev/min and gauge pressure = 1,0 bar (= maximum full-load control rod travel)

Testoil-ISO 4113

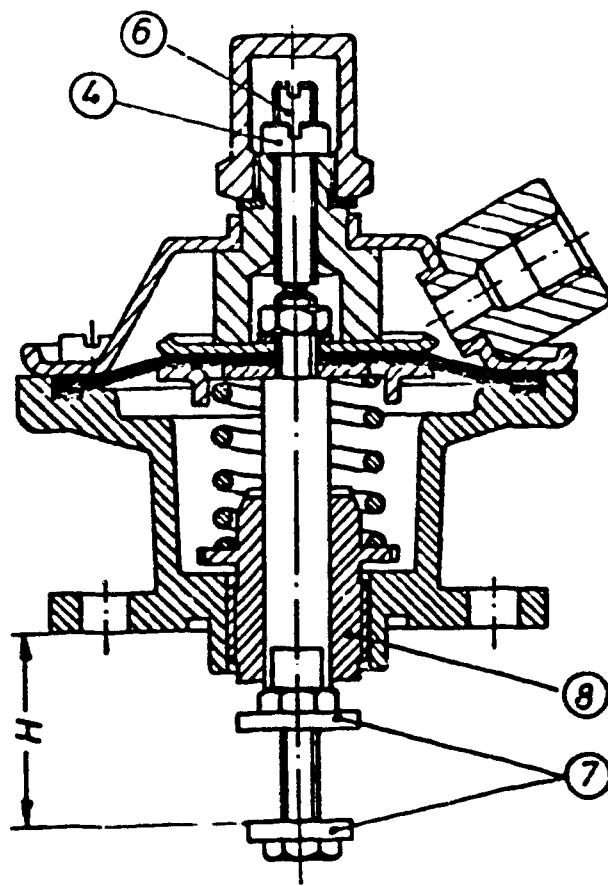
F23

F23 En

Test sequence:

1. Basic setting of pump and governor (Section A-B) without manifold-pressure compensator.
2. Adjust full-load delivery - delivery indication max. charge-air pressure - with full-load stop screw of governor. Measure fuel-delivery characteristics at 750 rpm; correct if necessary with torque-control retainer.
3. Pre-adjustment of manifold-pressure compensator: set dimension H - contact surface to lower stop screw (Item 7) -: Screw in adjusting screw in cover until this causes the diaphragm to be lifted off by 0.5 mm (delivery correction possibility during induction); counterhold screw during this operation to prevent diaphragm damage (items 4 and 6).
4. Fit manifold-pressure compensator taking care to ensure that bell crank is positioned between washers of lower stop screw. To do so, move bell crank sideways and position approx. 45° upwards. Pay attention to O-ring! As a check, actuate stop lever - full-load control-rod travel must be set. If starting travel is attained, bell crank is not properly in position. If less than full-load control-rod travel is attained, enlarge dimension H accordingly.
5. Connect compressed air - adjustment test at 500 rpm: test start and end, correct at guide bushing of helical spring. Establish control-rod-travel difference (Item 8).
6. Measure induction delivery (0 bar) - correct if necessary in accordance with Item 3!
7. Check/adjust full-load delivery, engine-speed limitation, idle and starting fuel delivery.

\* Dimension H  
370 DR = 33.3 mm



# ① Test Specifications Fuel Injection Pumps ① and Governors

40

VDT-WPP 001/4

5. Edition

En

PE 6 P 110 A 720 RS 270

RQV 250-1100 PA 240 R (1)

250-1050 (2)

EP/RSV 250-900P 1/389R (3)

supersedes

9.74

company

Chrysler, Spanien

engine

BS 36

see page 3

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke

2,8 + 0,1

mm (from BDC)

(-0,05 )  
(+0,15 )

Rotational speed rev/min 1	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Difference cm³/ 100 strokes 4	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Spring pre-tensioning (torque-control valve) mm 6
1000	12	11,0 - 11,9	0,5			
	9	4,0 - 5,2				
	15	17,1 - 18,9				
	9	2,1 - 3,1				

Adjust the fuel delivery from each outlet according to the values in 250-1100 PA 240R (1)  
150-1050 (2)

## B. Governor Settings

Upper rated speed Degree of deflection of control lever 1	Control rod travel mm 2	Control rod travel mm 3	Intermediate rated speed Degree of deflection of control lever 4	Control rod travel mm 5	Control rod travel mm 6	Lower rated speed Degree of deflection of control lever 7	Control rod travel mm 8	Control rod travel mm 9	Sliding sleeve travel rev/min 10	rev/min 11
ca.68	1150	15,0-17,6	-	-	-	ca.13	100	7,5-9,3	1150	8,4
	1220	9,3-13,8					250	4,4-7,2		
	1300	2,0- 8,8					350	0,5-3,5		
	1420	0					590	0		

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F) (2)	Rotational-speed limitation intermediate speed (4)	Fuel delivery characteristics (5a) high idle speed (5b)	Starting fuel delivery idle switching point (6)	Torque-control travel (5)
rev/min 1	cm³/1000 strokes 2	rev/min 3	rev/min 4	rev/min 8
rev/min 1	cm³/1000 strokes 2	rev/min 3	rev/min 4	rev/min 8
(1) 1100	0,9 bar 166,0-168,0 (163,0-171,0) (VH ca.68)	1120-1130*	LDA 1100	0 bar 127,0-131,0 (124,0-134,0)
(2) 1050	166,0-168,0 (163,0-171,0) (VH ca.64)	1070-1080*	1050	127,0-131,0 (124,0-134,0)

Checking values in brackets

\* 1 mm less control rod travel than col. 2

G1

BOSCH

The numbers denote the sequence of the tests

**B. Governor Settings**

1 Upper rated speed rev/min Degree of deflection of control lever 1 2 3			Intermediate rated speed Control rod travel mm rev/min 4 5 6			4 Control-lever deflection in degrees 7		Lower rated speed rev/min Control rod travel mm 8 9		3 Torque control rev/min Control rod travel mm 10 11	
ca.50			900	16,0		ca.24		250	6,0	900	
			950	12,0				100	19 - 21		
(2a)			1010	4,7				250	5,7-6,3	300	
			970	9 - 12				350	1,0-3,4		
			1050	1,0-3,2				460	0 - 1		
			1120	0,3-1,0							
			without auxiliary spring								
			with auxiliary spring								

**C. Settings for Fuel Injection Pump with Fitted Governor**

2b Full-load stop Test oil temp. 40°C (104°F) rev/min cm³/1000 strokes 1 2			6 Rotational-speed limitat. Note: changed to ...) rev/min 3		3a Fuel delivery characteristics rev/min cm³/1000 strokes 4 5		Starting fuel delivery Idle rev/min cm³/1000 strokes 6 7		5 Idle stop Control rod travel mm 8 9		
0,9 900			kp/cm² 162,0-164,0 (161,0-165,0)		920-930*		0 900	kp/cm² 130,0-134,0 (129,0-135,0)		250 6,0	

Checking values in brackets

\* 1 mm less control rod travel than col. 2

**Testoil-ISO 4113****B. Governor Settings**

1 Upper rated speed rev/min Degree of deflection of control lever 1 2 3			Intermediate rated speed Control rod travel mm rev/min 4 5 6			4 Control-lever deflection in degrees 7		Lower rated speed rev/min Control rod travel mm 8 9		3 Torque control rev/min Control rod travel mm 10 11	
(2a)											

**C. Settings for Fuel Injection Pump with Fitted Governor**

2b Full-load stop Test oil temp. 40°C (104°F) rev/min cm³/1000 strokes 1 2			6 Rotational-speed limitat. Note: changed to ...) rev/min 3		3a Fuel delivery characteristics rev/min cm³/1000 strokes 4 5		Starting fuel delivery Idle rev/min cm³/1000 strokes 6 7		5 Idle stop Control rod travel mm 8 9	

Checking values in brackets

\* 1 mm less control rod travel than col. 2

**G2**

En

Adjustment of manifold-pressure compensator (LDA)  
(pump 270 with governor 240 and 389)

1. Basic adjustment (Section A) and governor (Section B) without LDA.
2. Attach LDA
3. Section C      Induction setting (pressure 0 kp/cm<sup>2</sup>)  
                      at bell crank of LDA.  
  
                      Charge setting (pressure 0.9 kp/cm<sup>2</sup>)  
                      with stop screw in housing.  
  
                      Engine speed - limitation - column 3
4. LDA adjustment      Control-rod-travel difference and LDA adjustment  
                            Control-rod-travel difference with stop screw of bell crank  
  
                      LDA adjustment - 500 min<sup>-1</sup> - decreasing pressure  
                      Setting    0.41 - 0.44 kp/cm<sup>2</sup> - 0.1 mm decrease in  
                      control-rod travel  
                      Measurement 0.21 - 0.26 kp/cm<sup>2</sup> - 1.5 mm decrease  
                      in control-rod travel
5. Set/measure idle and starting fuel delivery.

# ① Test Specifications Fuel Injection Pumps ① and Governors

40

WWP 001/4  
5. Edition

En

PES 6 P 110/720 RS 192	RQV 275-1050 PA 130 KR	supersedes	6.75
.. A..	.. 155 KR, 157 KR 158 KR, .. 159 KR, 160 KR 203 KR, 272 KR	company	Mack
		engine	673

All governors = dimension B = see page ... - manifold-pressure  
compensator - section D, see page 2!  
All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke 2,8 + 0,1 mm (from BDC)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
1000	12	15,0 - 15,8	0,6			
600	6	2,0 - 3,0				
600	12	14,4 - 16,1				
600	15	20,0 - 21,9				
200	6	2,0 - 3,0				

Adjust the fuel delivery from each outlet according to the values in

## B. Governor Settings

Upper rated speed Degree of deflection of control lever	Control rod travel rev/min	Intermediate rated speed Degree of deflection of control lever	Lower rated speed Degree of deflection of control lever	Sliding sleeve travel rev/min
1	2	3	4	5
ca.66	1050	15,0-17,6	-	200
	1100	9,8-14,0	-	320
	1150	4,9- 9,5	-	350
	1260	0	-	450
			ca.10	550
				680
				0
				0 - 1,0
				2,0- 2,4
				6,0- 6,4
				8,2

Torque control travel a = mm  
RS 192 - RQV ... 203 KR

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)	Rotational-speed limitation intermediate speed	Fuel delivery characteristics high idle speed	Starting fuel delivery idle switching point	Torque-control travel
rev/min	rev/min	rev/min	rev/min	rev/min
1	2	3	4	5
1,1 1050	bar 152,0-156,0	1090-1100*	1,1 800 600 0 400	bar 163,0-169,0 184,0-190,0 141,0-149,0
			100 275	134 - 154 12 - 22
				1000 800 600 500
				12,1 12,7 13,6 13,3

Checking values in brackets

\* 1 mm less control rod travel than col. 2

### C. Settings for Fuel Injection Pump with Fitted Governor

-2- a

engine power Full-load delivery Control-rod stop Test oil temp 40°C (104°F)		Rotational-speed limitation	Fuel delivery characteristics		Starting fuel delivery idle switching point		Intermediate rotational speed Torque-control travel	
rev/min	cm <sup>3</sup> /1000 strokes	rev/min	rev/min	cm <sup>3</sup> /1000 strokes	rev/min	cm <sup>3</sup> /1000 strokes	rev/min	mm
1	2	3	4	5	6	7	8	

RS ..192 - RQV ..130KR;272KR	100	134 - 154	1000	12,1
1000 152,0-156,0 1090-1100*	800	163,0-169,0	275	900 12,3
			12 - 22	800 12,7
				700 13,3
				600 13,6
				500 13,3

RS ..192 - RQV ..156KR	1000	12,0		
1000 152,0-155,0	800	141,0-147,0	900	11,9
	700	135,0-141,0	800	11,7
			700	11,4
			600	11,2
			500	11,0

RS ..192 - RQV ..157KR	1000	9,6		
1000 101,0-105,0	700	109,0-115,0	900	9,8
			800	10,0
			700	10,1
			600	10,2
			500	10,0

RS ..192 - RQV ..158KR	1000	10,3		
1000 112,0-116,0	700	108,0-114,0	900	10,3
			800	10,2
			700	10,2
			600	10,1
			500	10,0

RS ..192 - RQV ..159KR	1000	10,6		
1000 122,5-125,5	700	127,0-131,0	900	10,6
			800	10,6
			700	10,4
			600	10,3
			500	10,2

RS ..192 - RQV ..160KR	1000	10,9		
1000 128,0-132,0	800	123,0-129,0	900	11,0
			800	10,7
			700	10,6
			600	10,6
			500	10,5

Section D - Adjustment test n = 500 r/min pressure drop - control lever to full:

Only for 203: Setting 0.65 bar = 0.2 mm control-rod travel decrease  
Measurement 0.17-0.30 bar = 2.0 mm control-rod travel decrease

Checking values in brackets

\* 1 mm less control rod travel than col 2

G5

En  
G5

Testoil-ISO 4113

MACK - test-specification table and instructions1.1 T A B L E

Pump	Governor	Dimension	Test-specification sheet
PES 6 P ... 192	RQV... 130, 156, 157, 158, 159, 160, 203, 272KR	"B"	a
PES 6 P ... 192	RQV... 285KR 286KR	"PLE"	b
PES 6 P ... 192	RQV... 317, 333KR 340KR	"B" "PLE"	c
PES 6 P ... 352	RQV... 358KR 359KR	"B" "PLE"	d
PES 6 P ... 357	RQV... 381KR	"B"	e
PES 6 P ... 3024	RQV... 326, 332KR	"PLE"	f
PES 6 P ... 3024 3036	RQV... 342, 344KR 365, 366KR	"PLE + LDA"	g

1.2 Test equipment as per WPP 110/2: "S-nozzles" and tubing 6 x 1.5 x 600 mm

Test instructions for RQV-K governor W 420/303.

Following each full-load measurement, set engine speed to next measurement point and simultaneously allow graduates to run out for approx. 1 minute!

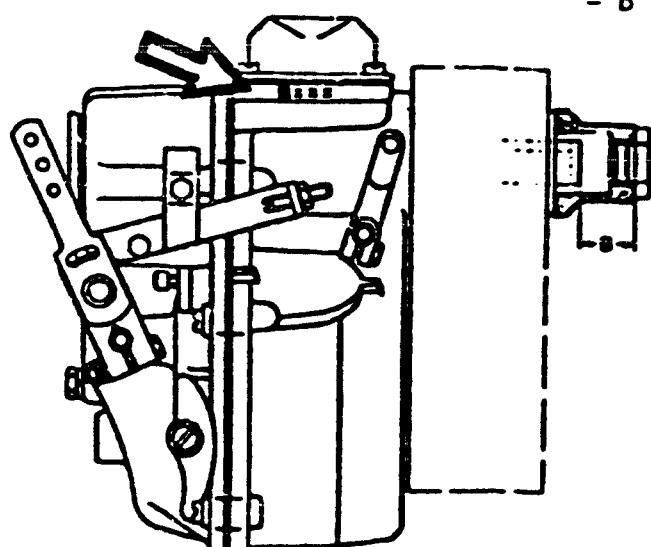
2. Notes: Static check of control-rod travel - dimension B  
2.1 Remove closure cap.

2.2 Set control lever to "FULL" = 21 mm control-rod travel and lock.

2.3 Pull stop lever several times to "STOP" and release.  
The edge must make contact with the cam.

2.4 Measure dimension "B" and convert to "inches" as per drawing.  
Check dimension determined by actuating stop lever again and mark as per drawing (1 inch = 25.4 mm).

Example: Measured B = 20.1 : 25.4 = 1.185/1000 inches  
= mark B 1185!  
= B 1185 einschlagen!



### 3. Checking and marking PLE dimension

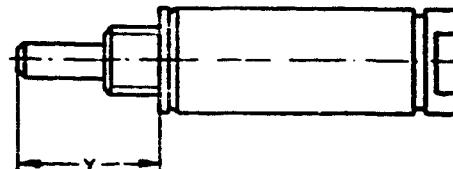
If, for some reason, there is no PLE dimension or if a complaint is received about inadequate performance and this is due to an incorrect PLE dimension, the pump is to be removed and tested on an injection-pump test bench:

1. Clamp pump on to test bench.
2. Apply at least 4.22 bar compressed air to air cylinder, so as to fully extend plunger.
3. Hold control lever on full load and run test bench at  $300 \text{ min}^{-1}$  - pay attention to inch tolerance!
4. With 1000 strokes quantity of fuel injected must be 115 - 121 cm<sup>3</sup>. If the measured quantity is outside the stated tolerance, continue with 5; otherwise with 8.
5. Set speed to 0 and discharge air from air cylinder.
6. Remove air cylinder and fit shims if quantity is too low or remove shims if quantity is too high.
7. Attach air cylinder and repeat items 2 - 4. Repeat items 5 and 6 if quantity is still not within tolerance.
8. Set speed to 0 and discharge air from air cylinder.
9. Remove air cylinder.
10. Apply at least 4.22 bar compressed air to removed air cylinder and measure dimension "Y" of cylinder. Dimension "Y" is the distance from the contact surface of the cylinder at the end of the thread to the tip of the extended plunger rod.

Subtract PLE dimension from dimension Y and select shims which approximately correspond to result.

Example :

Y 1.125  
PLE 1.037  
0.088 inches



Make up difference with shims.

The shims can be obtained from Mack representative.

11. Mark PLE dimension at location described - see diagram, item 2.

4.77

G7

En

67

# ① Test Specifications Fuel Injection Pumps ① and Governors

40

WPP 001/4  
1. Edition

En

PES 6 P 110 A 720 RS 192 RQV 300/600-1050 PA 317 KR

... PA 333 KR

... PA 340 KR

supersedes  
company  
engineMack  
ET 673  
(260 HP)317 KR u. 333 KR = Dimension B  
340 KR = Dimension PLE -- see page 2!

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke 2,8 + 0,1 mm (from BDC)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
1000	12,7	16,9 - 17,3	0,4			
	15,0	20,1 - 21,7				
	6,0	2,3 - 3,1				

Adjust the fuel delivery from each outlet according to the values in 

## B. Governor Settings

.. 317 KR

Upper rated speed Degree of deflection of control lever	Control rod travel mm		Control rod travel rev/min	Intermediate rated speed Degree of deflection of control lever		Control rod travel rev/min	Control rod travel mm	Lower rated speed Degree of deflection of control lever	Control rod travel rev/min	Control rod travel mm	Sliding sleeve travel rev/min
1	2	3	4a	4	5	6	7	8	9	10	11
ca.68	1050	16,4-18,8	-	-	-	-	ca.19	250	9,8-11,5	300	0,8-2,1
	1150	4,2-10,0						400	2,2- 5,2	400	550=
	1200	0 - 5,6						700	0,8- 2,0	900	2,9-4,4
	1260	0						830	0	1050	5,8-6,2
											7,9

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)	Rotational-speed limitation intermediate speed		Fuel delivery characteristics high idle speed	Starting fuel delivery idle switching point		Torque-control travel		
rev/min	cm³/1000 strokes		rev/min	cm³/1000 strokes		rev/min	cm³/1000 strokes	rev/min
1	2	3	4	5	6	7	8	9
1050	167,0-169,0	1090-1100*	750	165,0-169,0	275	145 - 175	1050	12,7
			500	124,0-130,0	300	14,0-23,0	750	12,7
					1150	29,0-49,0	500	10,9

Checking values in brackets

\* 1 mm less control rod travel than col 2

G8

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4.77

## B. Governor Settings

... 333 KR

C

-2-

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel	
Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm
1	2	3	4	5	6	7	8	9	10	11
ca.68	1050	16,4-18,8	-	-	-	ca.19	250	9,8-11,5	300	0,8-2,1
	1150	4,2-10,0					400	2,2- 5,2	400-500	=2,9-4,4
	1200	0 - 5,6					700	0,8- 2,0	900	5,8-6,2
	1260	0					830	0	1050	7,9

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed		Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point		Torque-control travel	
rev/min	cm³/1000 strokes	rev/min	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm
1	2	3	4	5	6	7	8	9	10
1050	167,0-169,0	1090-1100*	750	165,0-169,0	275	145,0-175,0	1050	12,6	
			500	124,0-127,0	300	14,0- 23,0	750	12,7	
					1155	49,0- 69,0	500	11,0	

Checking values in brackets

\* 1 mm less control rod travel than col. 2

Testoil-ISO 4113

## B. Governor Settings

... 340 KR

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel	
Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm
1	2	3	4	5	6	7	8	9	10	11
ca.68	1050	16,4-18,8				ca.19	250	9,8-11,5	300	0,8-2,1
	1150	4,2-10,0					400	2,2- 5,2	400-500	=2,9-4,4
	1200	0 - 5,6					700	0,8- 2,0	900	5,8-6,2
	1260	0					830	0	1050	7,9

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed		Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point		Torque-control travel	
rev/min	cm³/1000 strokes	rev/min	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm
1	2	3	4	5	6	7	8	9	10

Checking values in brackets

\* 1 mm less control rod travel than col. 2

G9

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En

MACK - test-specification table and instructions1.1 TABLE

Pump	Governor	Dimension	Test-specification sheet
PES 6 P ... 192	RQV... 130, 156, 157, 158, 159, 160, 203, 272KR	"B"	a
PES 6 P ... 192	RQV... 285KR 286KR	"PLE"	b
PES 6 P ... 192	RQV... 317, 333KR 340KR	"B" "PLE"	c
PES 6 P ... 352	RQV... 358KR 359KR	"B" "PLE"	d
PES 6 P ... 357	RQV... 381KR	"B"	e
PES 6 P ... 3024	RQV... 326, 332KR	"PLE"	f
PES 6 P ... 3024 3036	RQV... 342, 344KR 365, 366KR	"PLE + LDA"	g

1.2 Test equipment as per WPP 110/2: "S-nozzles" and tubing 6 x 1.5 x 600 mmTest instructions for RQV-K governor W 420/303.

Following each full-load measurement, set engine speed to next measurement point and simultaneously allow graduates to run out for approx. 1 minute!

## 2. Notes: Static check of control-rod travel - dimension B

2.1 Remove closure cap.

2.2 Set control lever to "FULL" = 21 mm control-rod travel and lock.

2.3 Pull stop lever several times to "STOP" and release.  
The edge must make contact with the cam.

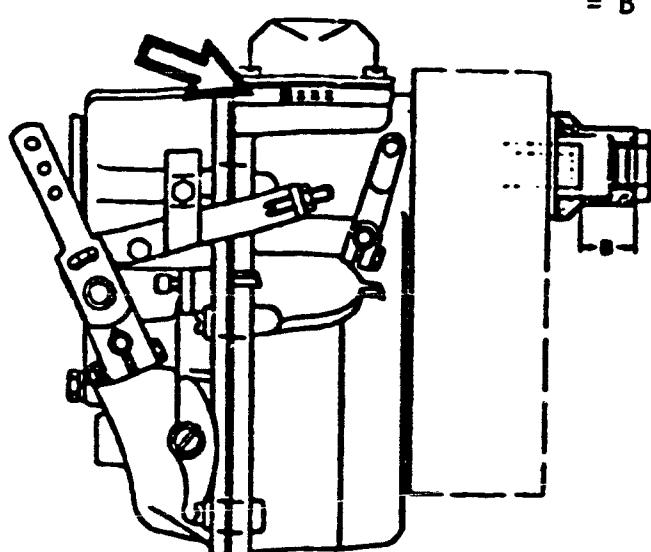
2.4 Measure dimension "B" and convert to "inches" as per drawing.

Check dimension determined by actuating stop lever again and mark as per drawing (' = 25.4 mm).

Example: Measured B = 30.1 : 25.4 = 1.185/1000 inches

= mark B 1185!

= B 1185 einschlagen!



3. Checking and marking PLE dimension

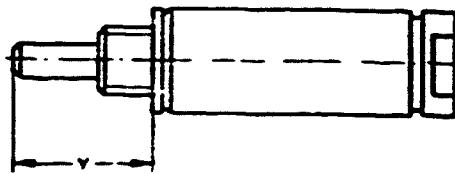
If, for some reason, there is no PLE dimension or if a complaint is received about inadequate performance and this is due to an incorrect PLE dimension, the pump is to be removed and tested on an injection-pump test bench:

1. Clamp pump on to test bench.
2. Apply at least 4.22 bar compressed air to air cylinder, so as to fully extend plunger.
3. Hold control lever on full load and run test bench at  $300 \text{ min}^{-1}$  - pay attention to inch tolerance!
4. With 1000 strokes quantity of fuel injected must be  $115 - 121 \text{ cm}^3$ . If the measured quantity is outside the stated tolerance, continue with 5; otherwise with 8.
5. Set speed to 0 and discharge air from air cylinder.
6. Remove air cylinder and fit shims if quantity is too low or remove shims if quantity is too high.
7. Attach air cylinder and repeat items 2 - 4. Repeat items 5 and 6 if quantity is still not within tolerance.
8. Set speed to 0 and discharge air from air cylinder.
9. Remove air cylinder.
10. Apply at least 4.22 bar compressed air to removed air cylinder and measure dimension "Y" of cylinder. Dimension "Y" is the distance from the contact surface of the cylinder at the end of the thread to the tip of the extended plunger rod.

Subtract PLE dimension from dimension Y and select shims which approximately correspond to result.

Example :

Y 1.125  
PLE 1.037  
0.088 inches



Make up difference with shims.

The shims can be obtained from Mack representative.

11. Mark PLE dimension at location described - see diagram, item 2.

4.77

G11

En

G11

# ① Test Specifications Fuel Injection Pumps ① and Governors

40

WPP 001/4  
1. Edition

En

PES 6 P 110 A 720 RS 192

RQV 300/600-1050 PA 285 KR (1)  
.. PA 286 KR (2)supersedes  
company  
engineMack  
ENDT 675 (1)  
(237 HP)  
ENDT 673 c(2)  
(250 HP)

286KE = Dimension B

285KR = Dimension PLE -.670-.745 inch see pag. 2!

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke

mm (from BDC)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1000	12,0	15,2 - 15,8	0,4			
600	15,0	19,7 - 21,7				
200	6,0	2,3 - 3,1				

Adjust the fuel delivery from each outlet according to the values in 

Testoil-ISO 4113

## B. Governor Settings

... 285 KR (1)

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel	
Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	Degree of deflection of control lever	rev/min	Control rod travel mm	rev/min	mm
1	2	3	1a	4	5	6	7	8	9	10
ca.66	1050	15,0-18,0	ca.35	600	14,0-15,0	ca.12	250	6,4-7,4	300	0,8-2,1
	1130	6,4-11,8		800	10,2-11,7		310	3,7-6,0	400	550
	1180	0 - 7,5		1000	4,1- 5,3		560	0,8-1,2	2,9-4,4	900
	1260	0		1100	0 - 1,5	3a	740	0 - 1,2	1050	5,3-6,2
										7,9

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed	Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point		Torque-control travel
rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	Control rod travel mm
1	2	3	4	5	6	7	8
1050	157,0-159,0	1090-1100*	800	173,0-177,0	275	145,0-175,0	1050
			500	180,0-186,0	300	14,0- 24,0	800
			PLE		1155	29,0- 59,0	500
			300	119 - 127			13,2

Checking values in brackets

\* 1 mm less control rod travel than col. 2

G12

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## B. Governor Settings

... 286 KR (2) b

-2-

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel			
Degree of deflection of control lever	rev/min	Control rod travel mm	①a	Degree of deflection of control lever	rev/min	Control rod travel mm	④	Degree of deflection of control lever	rev/min	Control rod travel mm	③	Sliding sleeve travel
1	2	3	②a	4	5	6	④	7	8	9	③	①
ca .66	1050	15,0-18,0	ca .35	600	14,0-15,0	ca .12	250	6,4-7,4	300	0,8-2,1		
	1130	6,4-11,8		800	10,2-11,7		310	3,7-6,0	400-550=			
	1180	0 - 7,5		1000	4,1- 5,3		560	0,8-1,2	900	2,9-4,4		
	1260	0		1100	0 - 1,5		740	0 - 1,2	1050	5,8-6,2		
												7,9

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp 40°C (104°F)			Rotational-speed limitation intermediate speed		Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point		Torque-control travel		
rev/min	cm³/1000 strokes	②	rev/min	④a	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	control rod travel mm	⑤
1	2	③	3	4	5	6	7	8	9	8	9
(2)	1050	154,0-156,0	1090-1100*	800	146,0-150,0	275	145,0-175,0	1050	12,1		
				500	125,0-131,0	300	14,0- 24,0	800	11,7		
						1155	29,0- 59,0	500	11,0		

Checking values in brackets

\* 1 mm less control rod travel than col. 2

Testoil-ISO 4113

## B. Governor Settings

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel			
Degree of deflection of control lever	rev/min	Control rod travel mm	①a	Degree of deflection of control lever	rev/min	Control rod travel mm	④	Degree of deflection of control lever	rev/min	Control rod travel mm	③	Sliding sleeve travel
1	2	3	②a	4	5	6	④	7	8	9	③	①

Torque control travel a = mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp 40°C (104°F)			Rotational-speed limitation intermediate speed		Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point		Torque-control travel		
rev/min	cm³/1000 strokes	②	rev/min	④a	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	control rod travel mm	⑤
1	2	③	3	4	5	6	7	8	9	8	9

Checking values in brackets

\* 1 mm less control rod travel than col. 2

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En

MACK - test-specification table and instructions1.1 TABLE

Pump	Governor	Dimension	Test-specification sheet
PES 6 P ... 192	RQV... 130, 156, 157, 158, 159, 160, 203, 272KR	"B"	a
PES 6 P ... 192	RQV... 285KR 286KR	"PLE"	b
PES 6 P ... 192	RQV... 317, 333KR 340KR	"B" "PLE"	c
PES 6 P ... 352	RQV... 358KR 359KR	"B" "PLE"	d
PES 6 P ... 357	RQV... 381KR	"B"	e
PES 6 P ... 3024	RQV... 326, 332KR	"PLE"	f
PES 6 P ... 3024 3036	RQV... 342, 344KR 365, 366KR	"PLE + LDA"	g

1.2 Test equipment as per WPP 110/2: "S-nozzles" and tubing 6 x 1.5 x 600 mmTest instructions for RQV-K governor W 420/303.

Following each full-load measurement, set engine speed to next measurement point and simultaneously allow graduates to run out for approx. 1 minute!

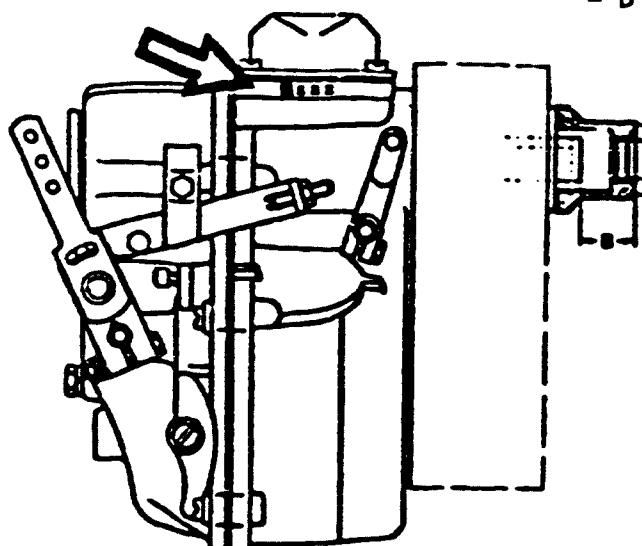
2. Notes: Static check of control-rod travel - dimension B  
 2.1 Remove closure cap.

2.2 Set control lever to "FULL" = 21 mm control-rod travel and lock.

2.3 Pull stop lever several times to "STOP" and release.  
 The edge must make contact with the cam.

2.4 Measure dimension "B" and convert to "inches" as per drawing.  
 Check dimension determined by actuating stop lever again and mark as per drawing (1 inch = 25.4 mm).

Example: Measured B = 30.1 : 25.4 = 1.185/1000 inches  
 = mark B 1185!  
 = B 1185 einschlagen!



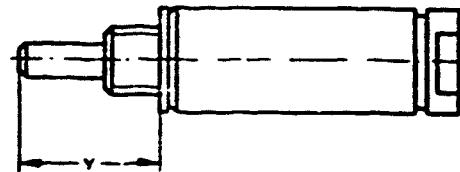
3. Checking and marking PLE dimension

If, for some reason, there is no PLE dimension or if a complaint is received about inadequate performance and this is due to an incorrect PLE dimension, the pump is to be removed and tested on an injection-pump test bench:

1. Clamp pump on to test bench.
2. Apply at least 4.22 bar compressed air to air cylinder, so as to fully extend plunger.
3. Hold control lever on full load and run test bench at  $300 \text{ min}^{-1}$  - pay attention to inch tolerance!
4. With 1000 strokes quantity of fuel injected must be  $115 - 121 \text{ cm}^3$ . If the measured quantity is outside the stated tolerance, continue with 5; otherwise with 8.
5. Set speed to 0 and discharge air from air cylinder.
6. Remove air cylinder and fit shims if quantity is too low or remove shims if quantity is too high.
7. Attach air cylinder and repeat items 2 - 4. Repeat items 5 and 6 if quantity is still not within tolerance.
8. Set speed to 0 and discharge air from air cylinder.
9. Remove air cylinder.
10. Apply at least 4.22 bar compressed air to removed air cylinder and measure dimension "Y" of cylinder. Dimension "Y" is the distance from the contact surface of the cylinder at the end of the thread to the tip of the extended plunger rod.

Subtract PLE dimension from dimension Y and select shims which approximately correspond to result.

Example :      Y 1.125  
                  PLE 1.037  
                  0.088 inches



Make up difference with shims.

The shims can be obtained from Mack representative.

11. Mark PLE dimension at location described - see diagram, item 2.

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G15

①

# Test Specifications Fuel Injection Pumps ① and Governors

40

WPP 001/4

5. Edition

En

PES 6 P 110 A 720 RS3024 RQV 300/600-1050 PA342KR  
PA344KR

supersedes

3.77

company

Mack

PES 6 P 110 A 720/3 RS3036 RQV 300/600-1050 PA365KR  
PA366KR

engine

ETA 676 B  
(306 PS)

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

## A. Fuel Injection Pump Settings

Port closing at prestroke 2,35 + 0,1 mm (from BDC) (+0,15)  
(-0,05)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/ 100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre-tensioning (torque-control valve) mm
1	2	3	4	2	3	6
1000	14,7	21,5-22,1	0,4			
300	5,2	1,5- 2,3				

Adjust the fuel delivery from each outlet according to the values in

Testoil-ISO 4113

## B. Governor Settings

Upper rated speed Degree of deflection of control lever	rev/min	Control rod travel mm	1a 2a	Intermediate rated speed			Lower rated speed			Sliding sleeve travel	
				4	5	6	7	8	9	3	10
ca.68	1070	15,5-18,0		-	-	-	ca.19	250	9,8-11,3	300	0,6-1,8
	1150	6,0-11,0						300	7,5- 8,5	400-	600-
	1200	0- 6,8						400	2,5- 5,0		3,1-3,6
	1280	0						580	2,5- 2,0	900	5,8-6,2
								700	0,8- 2,0	1070	8,2
								830	0		

Torque control travel a =  mm

## C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation intermediate speed		Fuel delivery characteristics high idle speed		Starting fuel delivery idle switching point		Torque-control travel	
rev/min	cm³/1000 strokes	rev/min	4a	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm
1	2	3		4	5	6	7	8	9
LDA	1,7 bar			LDA	1,7 bar			1050	14,7
1000	217,0-219,0	1090-1100*		800	217,0-223,0	100	ca.11,5mmRW	800	14,8
				500	229,0-235,0	300	ca. 5 mmRW	700	15,0
				LDA	0 bar	dispersion max.4		600	15,4
				600	141,0-147,0			500	15,0
				300	114 -120(PL)				

Checking values in brackets

\* 1 mm less control rod travel than col. 2

G20

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## D. Adjustment Test for Manifold Pressure Compensator

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Test at n = **600** rev/min increasing pressure - in bar gauge pressure

Pump/governor	Setting Gauge pressure =	bar	Measurement Gauge pressure =	bar	Control rod travel- mm (1)	diminution difference
S 3024 / 342KR + 344KR	0,4					
S 3036 / 365KR + 366KR			1,16-1,23			

Notes:

(1) when n =

rev/min and  
gauge pressure =

bar (= maximum full-load control rod travel)

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Testoil-ISO 4113

MACK - test-specification table and instructions1.1 TABLE

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PES 6 P ... 192	RQV... 130, 156, 157, 158, 159, 160, 203, 272KR	"B"	a
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PES 6 P ... 192	RQV... 317, 333KR 340KR	"B" "PLE"	c
PES 6 P ... 352	RQV... 358KR 359KR	"B" "PLE"	d
PES 6 P ... 357	RQV... 381KR	"B"	e
PES 6 P ... 3024	RQV... 326, 332KR	"PLE"	f
PES 6 P ... 3024 3035	RQV... 342, 344KR 365, 366KR	"PLE + LDA"	g

1.2 Test equipment as per WPP 110/2: "S-nozzles" and tubing 6 x 1.5 x 600 mmTest instructions for RQV-K governor W 420/303.

Following each full-load measurement, set engine speed to next measurement point and simultaneously allow graduates to run out for approx. 1 minute!

## 2. Notes: Static check of control-rod travel - dimension B

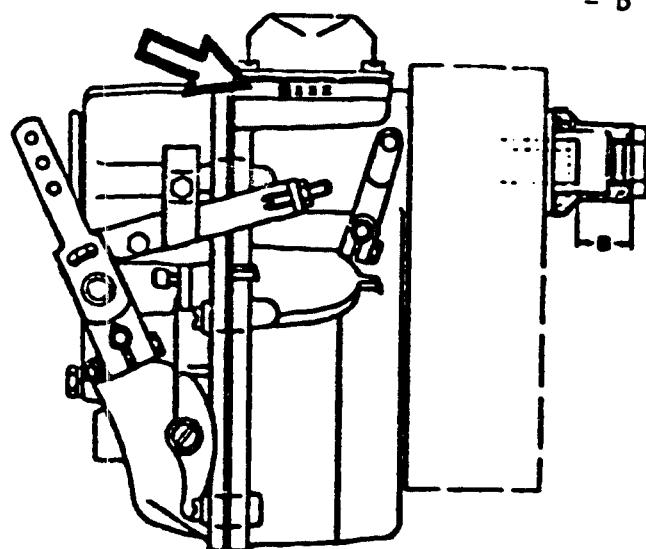
2.1 Remove closure cap.

2.2 Set control lever to "FULL" = 21 mm control-rod travel and lock.

2.3 Pull stop lever several times to "STOP" and release.  
The edge must make contact with the cam.

2.4 Measure dimension "B" and convert to "inches" as per drawing.  
Check dimension determined by actuating stop lever again and mark as per drawing (1 inch = 25.4 mm).

Example: Measured B = 30.1 : 25.4 = 1.185/1000 inches  
= mark B 1185!  
= B 1185 einschlagen!



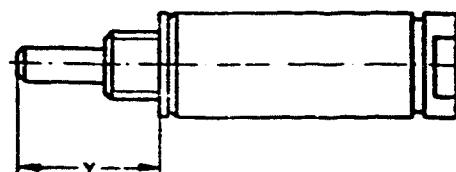
3. Checking and marking PLE dimension

If, for some reason, there is no PLE dimension or if a complaint is received about inadequate performance and this is due to an incorrect PLE dimension, the pump is to be removed and tested on an injection-pump test bench:

1. Clamp pump on to test bench.
2. Apply at least 4.22 bar compressed air to air cylinder, so as to fully extend plunger.
3. Hold control lever on full load and run test bench at  $300 \text{ min}^{-1}$  - pay attention to inch tolerance!
4. With 1000 strokes quantity of fuel injected must be  $115 - 121 \text{ cm}^3$ . If the measured quantity is outside the stated tolerance, continue with 5; otherwise with 8.
5. Set speed to 0 and discharge air from air cylinder.
6. Remove air cylinder and fit shims if quantity is too low or remove shims if quantity is too high.
7. Attach air cylinder and repeat items 2 - 4. Repeat items 5 and 6 if quantity is still not within tolerance.
8. Set speed to 0 and discharge air from air cylinder.
9. Remove air cylinder.
10. Apply at least 4.22 bar compressed air to removed air cylinder and measure dimension "Y" of cylinder. Dimension "Y" is the distance from the contact surface of the cylinder at the end of the thread to the tip of the extended plunger rod.

Subtract PLE dimension from dimension Y and select shims which approximately correspond to result.

Example :      Y 1.125  
                  PLE 1.037  
                  0.088 inches



Make up difference with shims.

The shims can be obtained from Mack representative.

11. Mark PLE dimension at location described - see diagram, item 2.

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## D. Adjustment Test for Manifold Pressure Compensator

-5-

Test at  $n =$  rev/min decreasing pressure - in bar gauge pressure  
increasing

Pump/governor	Setting	Measurement	Control rod travel: mm	diminution difference (1)
	Gauge pressure = bar	Gauge pressure = bar		
S 3024 / 342 KR + 344 KR	0,4			
S 3036 / 365 KR + 366 KR		1,16 - 1,23		

Notes

(1) when  $n =$

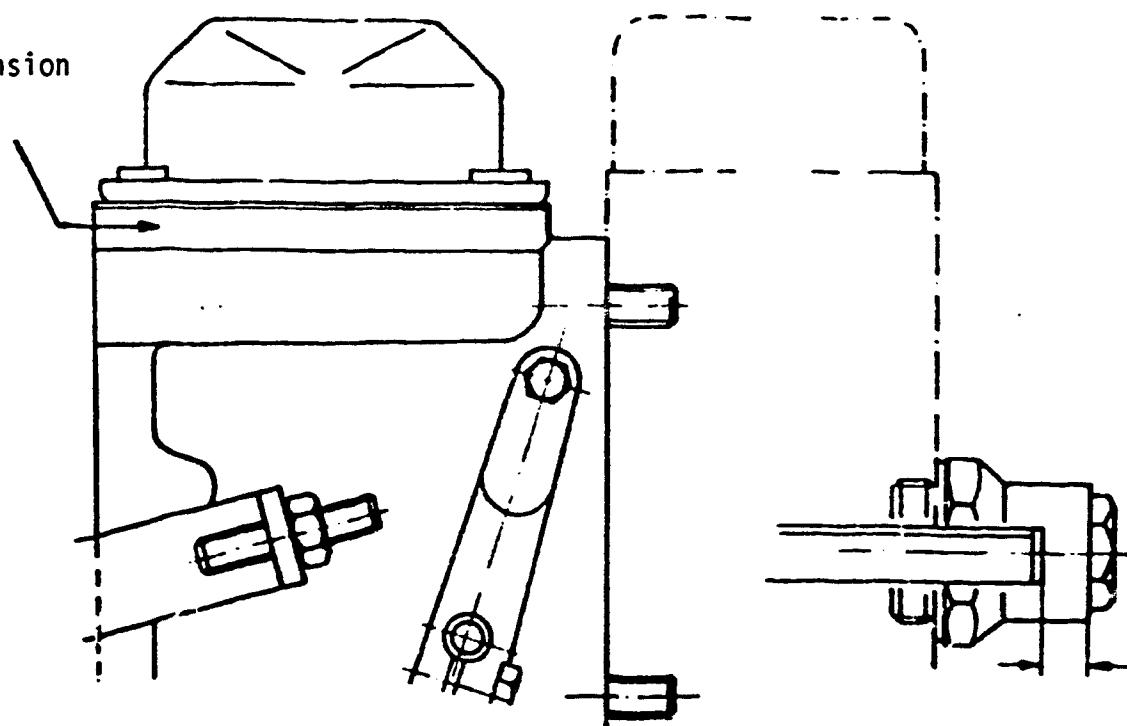
rev/min and  
gauge pressure =

bar (= maximum full-load control rod travel)

### PLE measurement:

1. Remove closure cap
2. Set at  $n = 300 \text{ min}^{-1}$  with control lever =  $115-121 \text{ cm}^3/1000$  strokes.
3. Measure distance as shown, convert to inches and mark (1 inch = 25.4 mm)

Mark  
dimension  
here



# Test Specifications

## Fuel Injection Pumps 1A

### and Governors

40

WPP 001/4 MB 11,4 1 4

1. Edition

En

PES 6 P 110 A 820 LS 442 RSV 350-750 P 1/487

supersedes

company  
engine

Daimler-Benz  
OM 407

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

#### A. Fuel Injection Pump Settings

3,2-3,3  
Port closing at prestroke (3,15-3,35) mm (from BDC)

Rotational speed rev/min	Control rod travel mm	Fuel delivery cm³/100 strokes	Difference cm³/100 strokes	Control rod travel mm	Fuel delivery cm³/100 strokes	Spring pre tensioning (torque-control valve) mm
1	2	3	4	2	3	6
730	11,7+0,1	11,9-12,1	0,4(0,8)			
350	7,3-7,5	1,1- 1,9	0,4(0,7)			

Adjust the fuel delivery from each outlet according to the values in [ ]

#### B. Governor Settings

Degree of deflection of control lever	1 Upper rated speed rev/min		Intermediate rated speed			4 Control-lever deflection in degrees	Lower rated speed		3 Torque control	
	Control rod travel mm	Control rod travel mm rev/min	4	5	6		rev/min	Control rod travel mm	rev/min	Control rod travel mm
1	2	3				7	8	9	10	11
loose	800	0,3-1,0	-	-	-	-	-	-	-	-
	X =	2,5								
ca.	10,7	750-755								
	4,0	785-795								
2a	850	0,3-1,7								

The numbers denote the sequence of the tests

#### C. Settings for Fuel Injection Pump with Fitted Governor

2b Full-load stop		6 Rotational-speed limitat	3a Fuel delivery characteristics		Starting fuel delivery		5	4a Idle stop
Test oil temp. 40°C (104°F)	rev/min	Note changed to ) rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm
1	2	3	4	5	6	7	8	9
730	119,0-121,0 (116,0-124,0)	750-755*	-	-	100	130,0-150,0		

Checking values in brackets

\* 1 mm less control rod travel than col. 2

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